

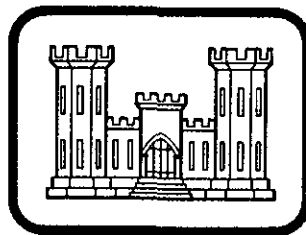
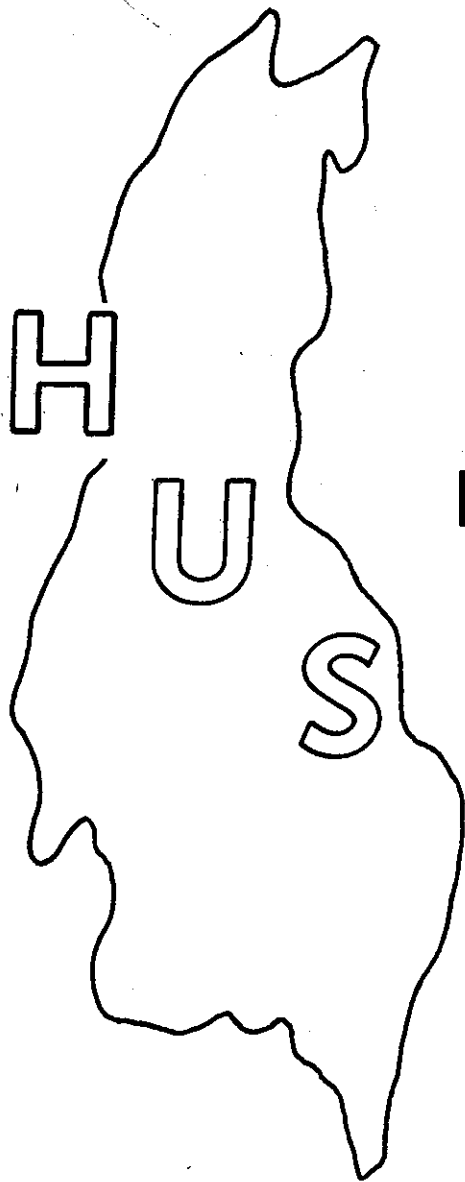
# HOUSATONIC RIVER BASIN

## URBAN STUDY

### RECONNAISSANCE REPORT

JANUARY 1979

(Revised June 1979)



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
WALTHAM, MASS.

HOUSATONIC RIVER BASIN  
URBAN STUDY  
RECONNAISSANCE REPORT

ADDENDUM

JUNE 1979

Department of the Army  
New England Division, Corps of Engineers  
Waltham, Massachusetts

## Introduction

This addendum provides a revision to the "Housatonic River Basin, Urban Study, Reconnaissance Report, January 1979." The addendum was prompted by a 29 March 1979 meeting at the office of Chief of Engineers in Washington. New Federal guidelines have revised the scope of the urban study from three stages to two. As a result, the urban study will not develop a final recommended plan but present and evaluate an array of feasible alternative plans.

The study efforts to be performed for the two major work items which have changed as a result of the new guidelines are presented below. The Coastal Area Protection and Recreation major work items remain the same as presented in the Reconnaissance Report. This addendum along with the Reconnaissance Report outlines the work effort for the remainder of the study and updates the Stage II progress to date.

## Water Supply Management

### Additional Study Area

The 14 communities in southwestern Connecticut - Bridgeport, Darien, Easton, Fairfield, Greenwich, New Canaan, Norwalk, Redding, Ridgefield, Stamford, Trumbull, Weston, Westport and Wilton - will be included in

the water supply portion of the study because of the major impact of their potential demands on the basin's resources. Previous studies indicate future developable water resources of this urban area are very limited and these communities are looking toward the adjacent Housatonic Basin for future water supply sources. A study area map for the water supply portion of the study is shown on Plate A-1.

#### Detailed Needs Assessment

Short and long-range water resources plans will be developed for the study area. The short-range plans will extend to the year 2000 and the long-range to 2030. Population projections to the year 2000 have been made for Section 208 studies. If these projections are still valid and acceptable to both States they will be used in this study to develop short-range plans. Long-range population projections have not been made by either State, but Connecticut has been engaged to make the projections for this study and a similar effort is being initiated in Massachusetts.

Water demand and consumption data is available for the basin from many different sources. Historic and existing water use data will be compiled from utility control agencies, Departments of Health, water utilities, other State, Federal and local agencies and from completed







and ongoing reports. This effort has already begun. A water utility survey that is gathering historic and existing water consumption data is nearing completion. Regional Planning Agencies throughout the basin are reviewing and summarizing existing reports and plans for the urban study. The Natural Resources Center in Connecticut is in the process of gathering data from many of the State agencies involved with water resources planning.

Projection methodologies used in other studies in the basin by Federal, State, regional and local agencies will be compiled and summarized. The methodologies will be discussed with representatives of other agencies to decide which ones will be used in this study. Those selected will be entered into a data storage program recently developed by the NED. The computer program will then project water demands for each community.

Alternative population projections and development schemes in each State will also be compiled and entered into the computer program. Water demands for each alternative future condition will then be projected for each community. The sensitivity to changing future conditions can then be analyzed for each water resources plan developed.

An inventory of results of each water utility's use of water conservation practices within the basin will be assessed. Also, the results of other water utilities and studies will be reviewed. From these investigations, savings possible through the various water conservation practices will be determined. The effect of these savings on each plan will be assessed.

#### Resource Evaluation

Groundwater - Potential aquifers in each State have been identified in previous studies. The urban study will update the land use at each aquifer site and determine the suitability of each for development as a water supply source. Based on available quality information, land use and distance from need areas, the aquifers will be screened to a reasonable number of feasible sites. Well drilling logs for the remaining aquifers will be examined and these sites will be modeled to determine preliminary yields. The yields will then be adjusted by deducting the capacities of all wells currently using the aquifer. Connecticut will also use this information to implement its Aquifer Assessment Program, which will consist of seismic investigations and some drilling and pump testing.

Surface Water - The potential surface water resources in each State are at different levels of development. In Connecticut a screening of all

potential sources was done by the State. The urban study will investigate the 12 surface water sites suggested in Connecticut's "Plan of Conservation and Development." All available information on each of the sites will be compiled and reviewed. If the safe yield of a site is not known, preliminary design, cost estimates and hydrologic investigations will be undertaken. Upstream and downstream environmental impacts for each site will be determined.

In 1969 SCS conducted a study of potential reservoir sites in Massachusetts. Since that time the 189 original sites have been reevaluated and the 87 most promising potential sites have been identified. All costs developed by SCS on construction, operation and maintenance, etc., will be updated. Hydraulic information previously developed to determine safe yield will be updated, if necessary. Environmental impacts upstream and downstream of each site will also be determined.

Upon completion of this preliminary evaluation, the study team will eliminate from further study all water sources regarded as being unsuited for development. All seemingly feasible sites will be delineated on maps.

#### Alternative Development and Assessment

Alternative plans will be developed by the study team, assisted by meetings with representatives of various agencies. The size of the

various structures and transmission mains required to meet specific needs will be determined for each alternative.

Based on existing information the quality of the specific resources will be assessed. The treatment necessary to meet Department of Health standards and the Safe Drinking Water Act standards will be determined.

The total cost of all treatment facilities, transmission mains and structures, including dams, well fields and pump stations, will be determined. The cost of land for structures, transmission mains, well fields and reservoir areas will also be ascertained. They will be presented for each alternative as total cost, average annual cost and operation and maintenance costs.

Each alternative will be assessed for the environmental impacts of all structures and transmission mains on fish and wildlife in upstream and downstream areas. An evaluation of the socio-economic impacts associated with each alternative plan will also be undertaken. Impacts such as relocations and changes in industry, land use and tax base will be discussed and evaluated.

The existing and potential recreational opportunities at each site will be listed, and the change in recreation potential will be evaluated for each alternative plan.

The adverse and beneficial impacts associated with each alternative will be summarized in the Water Resources Council's System of Accounts. An evaluation of each alternative plan will then be made based on the total social, economic, environmental and recreational impacts shown in the System of Accounts.

The sensitivity of each plan will be assessed using alternative future development schemes. The impacts of each alternative future on the plans will be discussed. This analysis will give the plans flexibility in the event development doesn't follow the most probable future projections.

The final major step in the two-stage study will be the development of institutional alternatives and implementation plans. The institutional alternatives will be developed for each of the urban study's feasible water resource plans.

## Inland Flood Control and Flood Plain Management

### Flood Plain Delineation and Damage Survey

Flooding is a potential problem in Connecticut, where the potential flood damage areas are widespread and located throughout much of the basin. Preliminary investigations of the existing land use in the 100-year flood plain, as delineated in the completed Flood Insurance Studies, indicate that nonstructural measures would be adequate for most of these areas. The Flood Insurance Studies were done by various agencies at different times on a town-by-town basis, and the hydraulic data developed in these studies is not consistent or complete.

The major flooding problems in Massachusetts occur along a reach of the Housatonic River flowing through a four-town area in and around Pittsfield. Preliminary hydraulic investigations made by SCS along this reach indicate structural solutions may be needed. There is very little hydrologic information available for the remaining portion of the basin.

Based on the information gathered to date, a complete hydrologic investigation will be needed to develop detailed stage-frequency curves. The curves will be used to delineate flood plains for various floods according to their frequency.

The identified flood plains will be investigated to update existing land use. Potential land use will also be identified, based on local zoning maps. Damage estimates will be made for all major structures located within the flood plains, and structural measures will be considered for all major damage areas in the basin. All flood plains with existing or potential damage areas will be included in the basinwide non structural flood control study.

Structural measures which could protect the major damage areas will be identified, and preliminary design and cost estimates will be developed for each. Benefit-cost ratios will be computed for each of the structural alternatives to determine the most cost effective method for alleviating the problem. The environmental and socio-economic impacts associated with each structural alternative will be fully identified and evaluated.

All existing laws and regulations adopted by local and State agencies to alleviate or prevent potential flood damages will be identified and



evaluated. All potential nonstructural measures will be identified and discussed fully, and nonstructural alternatives will be developed for all the existing and potential flood damage areas.

The nonstructural effort will include special hydrologic investigations--the effect of natural valley storage areas on floodflows and the effect upstream land use changes may have on downstream flood stages. Measures such as flood proofing, flood insurance, permanent evacuation and zoning ordinances will be considered in lieu of and in conjunction with structural alternatives.

Economic, social and environmental assessments of each nonstructural alternative will be made, and impacts on the urban areas resulting from plan implementation will be evaluated.

Institutional arrangements and implementation plans will be developed for each of the feasible flood control alternatives.

#### Scheduling

As noted previously, the Housatonic River Basin Urban Study will be undertaken in two time-phased stages rather than three as originally

planned. Detailed breakdowns of two of the major work items being undertaken in the urban study were revised to develop a new time schedule, task sequences and cost allocations. The schedule for the entire urban study, shown on Plate A-2, was designed to accommodate the most realistic funding schedule now envisioned for this study.

#### Work Task Schedules

During its process, the urban study's findings will be continually documented. Upon completion of all efforts, the stage II final study report will consist of a separate summary document and the supporting appendices listed below.

#### Summary Report

##### Appendices

Background Information (regional profile, problems, concerns, needs and projected future conditions)

Engineering Investigations, Design and Cost

Plan Formulation

Impact Assessment and Evaluation

Institutional Analysis

Public Involvement

Comments

FY1978	Prepare	M/S 01
	Draft	
	Reconnaissance	
	Report	
FY1979	Public Review and Comment	M/S 02
	Reconnaissance Revision and Resubmission	
	Gather Data and Make Projections	
	Initial Identification of Alternatives	
FY1980	Public Presentation of Initial Alternatives	
	Initial Identification of Impacts and Costs	
	Evaluation of Alternatives	
	Public Review of Impact Evaluation	
FY1981	Refine Alternatives to Satisfy NED, EQ Objectives and Publicly Preferred Plans and Refine Impact Assessment and Costs	
FY1982	Prepare System of Accounts and Evaluate Alternatives	M/S 03 M/S 04 M/S 05 M/S 08 M/S 010
	Prepare Draft Report	

Continuous drafting of the report will be required throughout the study to maintain a public awareness of its findings and to avoid a time-consuming writing effort at the end of the study.

#### Study Costs

A cost has been estimated for accomplishing each of the major work items shown on the work schedule. No cost sharing is required.

The total overall study effort has been estimated at \$914,000. The study is predicated on its being funded in accordance with the following schedule:

FY 1978	\$ 54,000
FY 1979	\$155,000
FY 1980	\$180,000
Balance After FY 1980	\$525,000

The allocation of costs among the various work items is given in Tables A-1 and A-2.

TABLE A-1

TOTAL STUDY COSTS BY MAJOR WORK ITEM AND EFFORT COMPONENT

(In Thousands of Dollars)

Effort Component	WORK ITEMS				
	Inland Flood Control and Flood Plain Management	Water Supply Management	Coastal Area Res-toration & Protection	Recreation and PCB Investigation	Total for Effort Component
1. Preparation of a Plan of Study	\$ 31.0	\$ 49.0	\$ 4.5	\$ 4.5	\$ 89.0
2. Plan Formulation and Evaluation					
a. Problem Identification	28.0	46.0	4.0	4.0	82.0
b. Formulation of Alternatives	73.0	120.0	11.0	11.0	215.0
c. Impact Assessment and Evaluation	73.0	120.0	11.0	11.0	215.0
d. Public Involvement and Institutional Studies	65.0	106.0	9.5	9.5	190.0
3. Study Documentation and Report Preparation	28.0	46.0	4.0	4.0	82.0
4. Study Management	<u>12.0</u>	<u>23.0</u>	<u>3.0</u>	<u>3.0</u>	<u>41.0</u>
TOTAL FOR WORK ITEM	\$310.0	\$510.0	\$47.0	\$47.0	\$914.0

TABLE A-2

FEDERAL AND NON-FEDERAL EFFORTS BY MAJOR WORK ITEMSUMMARY

		FEDERAL		NON-FEDERAL		TOTAL FOR MAJOR WORK ITEMS	
		Man-Years --	Cost -- (\$1,000)	Man-Years --	Cost -- (\$1,000)	Man-Years --	Cost -- (\$1,000)
15	Inland Flood Control and Flood Plain Management	7.0	\$310.0	-	-	7.0	\$310.0
	Water Supply Management	11.0	510.0	-	-	11.0	510.0
	Coastal Area Restoration	1.0	47.0	-	-	1.0	47.0
	Recreation and PCB Investigations	<u>1.0</u>	<u>47.0</u>	-	-	<u>1.0</u>	<u>47.0</u>
TOTALS		20.0	\$914.0	-	-	20.0	\$914.0

## PREFACE

This Reconnaissance Report, which concludes Stage I of the Housatonic Urban Study, was performed to determine whether a complete water resources study is needed in the Housatonic River Basin.

The basin problems identified during Stage I and included as work items in this report are water supply, flood plain management and tidal flooding. They were identified through meetings, discussions and correspondence with Federal, State, regional and local agency representatives as well as special interest groups. Each of these areas was then investigated to determine the magnitude of the problem.

Based on investigations to date, it is concluded that a water resources study be continued into Stage II, at which time water resources plans would be developed to a general level of detail. Stage III, if found necessary, would continue the urban study to a level of detail necessary to evaluate and select a final water resources plan.

As noted in this Reconnaissance Report, water supply is presently adequate in the Massachusetts portion of the basin, where an abundance of developable resources exist. However, there is a concern over the quality of these resources, as PCB's have been located in surface and groundwater sources. In the southwestern portion of Connecticut, however, many of the towns are currently

experiencing periodic water supply shortages. The State of Connecticut has identified a set of priority water supply sites, proposed for preservation, to meet future water supply needs to a preliminary level of detail (in most cases without cost estimates) as part of their Statewide Long-Range Plan for the Management of Water Resources. They are presented in their Plan of Conservation and Development.

Based on the current status of the State of Connecticut's identified water supply sites and Massachusetts' existing quality problems, the following tasks would be performed as part of Stage II of the urban study:

- Conduct a detailed assessment of the water supply needs of each community
- Review any existing water supply plans to determine if all alternatives have been examined and to determine if any selected plan best meets community needs
- Develop preliminary cost estimates for the recommended water supply plans and various alternative plans
- Examine water conservation measures and savings possible through implementation
- Conduct a public participation program to keep in touch with the needs and desires of persons living within the watershed
- Perform environmental and socio-economic impact assessments and evaluations of recommended plans
- Devise an implementation program that includes schedules, priorities and flexibility-reliability analyses
- Perform legal, institutional and cost-sharing studies



Basin flood management problems are to be investigated in both States. Studies recently completed in Berkshire County of Massachusetts by the Soil Conservation Service indicate a potential for severe flood damage in this portion of the basin. The Soil Conservation Service estimates that damages of more than \$7.4 million would be inflicted by a 100-year frequency flood. Houses, commercial buildings, industrial plants, roads and bridges would be affected by a major flood. The S.C.S. estimate average annual flood damages at \$446,000.

Preliminary investigations of Connecticut's 100-year flood plain, as delineated by the department of Housing and Urban Development, indicate that a 100-year frequency flood would mostly affect small commercial establishments and summer cottages. Past experience shows that total dollar damage to these types of buildings is usually too small to justify flood control structures. Although non-structural solutions would be emphasized for southwestern Connecticut, both structural and non-structural alternative plans would be developed for the entire basin to satisfy flood control needs of the various urban centers. Economic, social and environmental assessments along with benefit-cost analyses would be developed for each alternative. Impacts on urban areas that would result from implementation of each plan would also be evaluated in Stage II.

The existing recreational usage throughout the basin will be determined and compared with estimated capacities for the different types of recreational uses, to aid the states in developing plans for future recreational development. The potential for water related recreation development will be determined for each alternative plan.

The PCB contamination of the Housatonic River is of interest to both states. A major concern is the effect of PCB's on existing and potential ground and surface water supply resources. During the assessment and evaluation phase of each alternative the adverse effects, if any, of PCB's will be determined.

The Boards of Health in each state have issued a warning that fish and wildlife taken from within and around the Housatonic River should not be eaten. The effect of these warnings on the recreational usage in the basin is not known. An evaluation will be made of the recreational usage before the warnings were issued and after, to determine the effect of PCB's on the usage within the basin.

The estimated time required to accomplish the tasks in the five categories are presented in the following table:

<u>WORK TASK</u>	<u>TIME IN MAN-YEARS</u>	
	<u>STAGE II</u> <u>11/78 to 3/80</u>	<u>STAGE III</u> <u>3/80 to 10/82*</u>
Water Supply	2.5	10
Flood Control	2.0	7.5
Tidal Flooding	1.0	3
Recreation	.5	1
PCB	.5	2

\*Stage III effort and distribution of effort dependent on outcome of Stage II.

Stage II of the Housatonic Urban Study would require an estimated 6.5 man-years to complete. Stage III, if found necessary would require an estimated 23.5 man-years to develop and evaluate alternatives and select a final water resources plan for the basin.

HOUSATONIC RIVER BASIN

URBAN STUDY

RECONNAISSANCE REPORT

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## SECTION I - JUSTIFICATION FOR THE STUDY

### A. Introduction

In May 1972, the North Atlantic Division of the U.S. Army, Corps of Engineers was assigned to study the Connecticut portion of the Housatonic River basin. A Plan of Study was prepared in coordination with the State of Connecticut in June 1974 proposing the investigation of water supply, flood control and wastewater management problems. However, the State of Connecticut requested that a re-evaluation of the urban study be made in view of their interest in Section 208 of PL 92-500 concerning wastewater management. By letter dated 24 January 1975, the Division Engineer, North Atlantic Division, proposed to Governor Grasso of Connecticut that the urban study be deferred until certain issues were resolved and that a possibility remains that it could be joined with the basin study in the Massachusetts portion of the basin at a later date. By letter dated 7 April 1975, the Governor concurred in the deferral of the urban study in Connecticut. Subsequently, by letter dated 9 May 1975, from the Office of the Chief Engineer, the Housatonic urban study was reassigned to the New England Division and combined with the Housatonic basin study, Massachusetts.

### B. Authority

Authority for the Housatonic Urban Study is vested in three outstanding resolutions (Appendix A) adopted by the Committee on Public Works of the United States Senate and House of Representatives, which were combined for study purposes.



C. Urban Studies Program Objectives

The fundamental objective of the urban studies program is to develop water and related resource plans for specified urban areas of the United States that not only offer realistic prospects for solving specific urban water problems but, also have the potential for solving other related problems.

The water and related resource plans will be developed to meet the following objectives:

1. address the specified problems, issues and concerns of the regional public by responding to expressed public desires and preferences;
2. be flexible to accommodate changing economic, social and environmental patterns and changing technologies;
3. integrate with and be complementary to other urban development and management programs;
4. be fully coordinated with affected public agencies at all levels;
5. be developed through an orderly, structured and open planning process;
6. be capable of implementation, with respect to financial and institutional capabilities and public consensus; and
7. where appropriate, be certified by applicable State and Federal agencies.

In order to meet the goal and the objectives of the Urban Studies Program, the planning process will consist of the following:

1. The development of a series of three to seven alternative urban water resources plans to meet long range (approximately 50 years) needs, from which a choice may be made prior to completion of the study;
2. An evaluation of that portion of each alternative designed to meet short range (approximately 20 years) needs;
3. An early action program for each alternative urban water resource plan which will meet short range (approximately 20 years) needs; and
4. Where appropriate, a proposal for Congressional authorization of selected elements of the early action program of the publicly selected "best" plan when these selected elements are traditional Federal responsibilities.

## SECTION II - IDENTIFICATION OF STUDY AREA

### A. Location

The Housatonic River Basin lies principally in the western part of Connecticut and the southwestern corner of Massachusetts with a small portion extending into eastern New York (Plate 1). It is bordered on the west and north by the Hudson River watershed, on the east by the Connecticut River Basin, and on the south and southeast by the Connecticut Coastal Area. The basin is roughly elliptical in shape with a maximum width in an east-west direction of 35 miles and maximum length in a north-south direction of 98 miles. It comprises an area of 1,950 square miles of which 1,232 are in Connecticut, 500 in Massachusetts and 218 in New York.

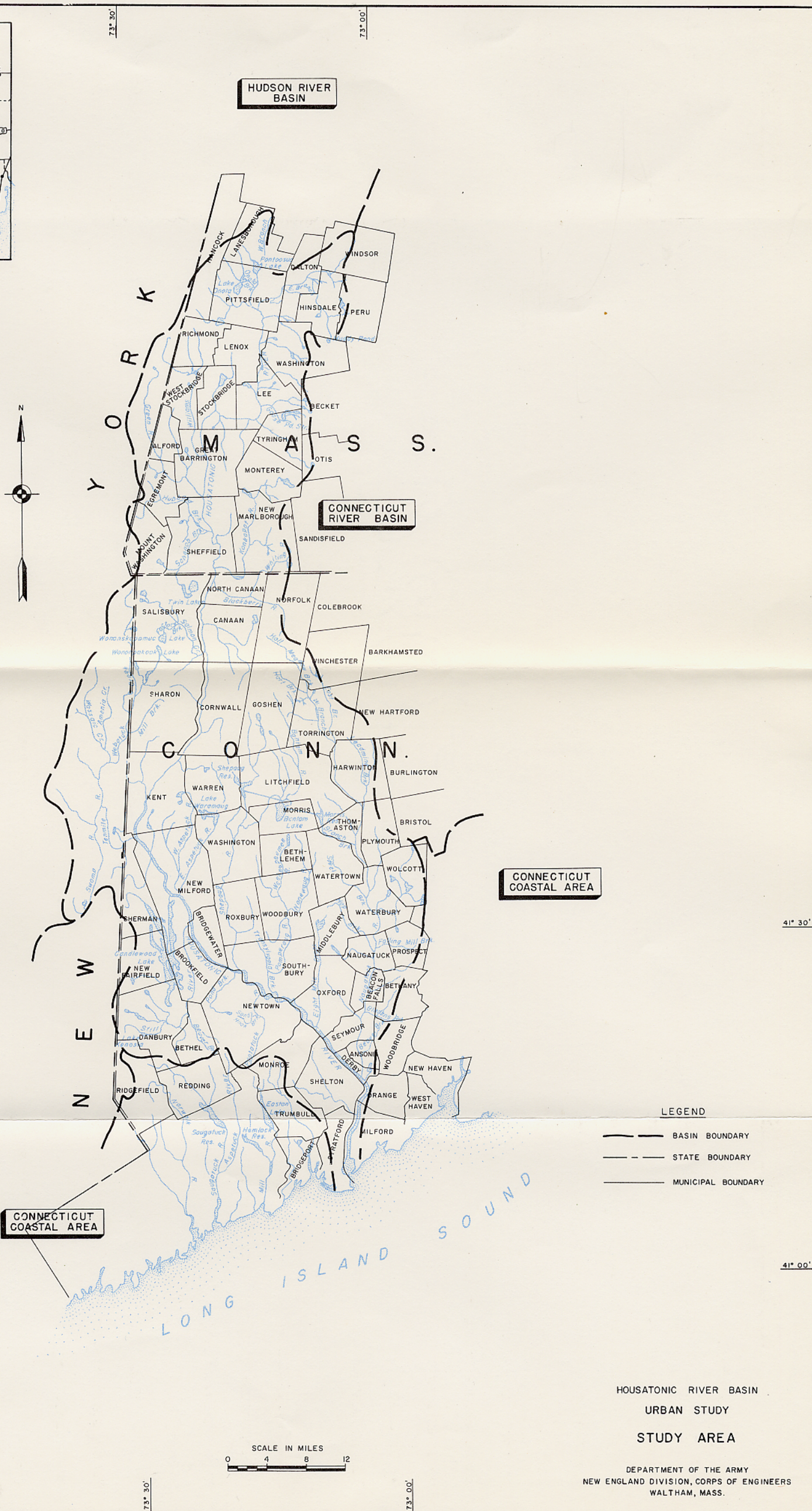
The Housatonic River, following a southerly course from Pittsfield, Massachusetts, through Connecticut to Long Island Sound, is approximately 132 miles long and has a total fall of 959 feet. Major tributaries include the Naugatuck, Shepaug, Pomperaug and Still Rivers.

The study area, limited to the area within Connecticut and Massachusetts, includes the upper, middle and lower portions of the Housatonic Basin and the major tributaries mentioned above. Six Regional Planning Agencies (RPA's) are located within the study area and three RPA's, encompassing the metropolitan areas of Bridgeport, New Haven and Bristol, exist on the study area's periphery.





LOCATION MAP  
SCALE IN MILES  
0 10 20 30 40 50 60





## B. Topography, Geology and Climate

The Housatonic River basin consists of rolling hills with steep-sided mountains rising to elevations of 2600 feet around the northern perimeter. The relief becomes more moderate in the middle portion of the basin which has elevations from 1200 to 1500 feet. In the lower area, the even crested hills rise approximately 500 feet above the valley floor. The sloped topography and narrow flood plains in the northern and middle portions of the basin have limited development to small villages, with the exception of Pittsfield, Massachusetts and Torrington, Connecticut, which are built on larger flood plains at the confluence of major rivers. The more moderate topography comprising the lower Housatonic and Naugatuck basins has allowed these areas to develop as major population and manufacturing centers.

The bedrock of the region consists primarily of gneiss, schist and marble. In the upper and middle portions of the Housatonic basin, 5 percent to 10 percent of the land is exposed bedrock and 25 percent to 30 percent of the land has bedrock within 10 to 15 feet of the surface. Glacially influenced, hard pan soils are found in both sparsely and densely settled areas where, as in the case of the latter, poorly drained soils contribute to a high rate of septic tank failures. Scattered deposits of sand and gravel, particularly along the rivers, are potentially good water supply aquifers.

The average annual temperature in the basin varies from 50°F near Long Island Sound to 44°F at points in the northern portion. Average annual rainfall varies from approximately 47 inches on the coast to about 44 inches at Pittsfield, Massachusetts. The average annual runoff for the basin is 22.5 inches a year, almost one-half of the average annual precipitation.

### C. Cultural and Natural Resources

The Housatonic River basin, with large stretches of sparsely inhabited forest covered hills and clear mountain streams abounds in aesthetic amenities that provide exceptional nature-related recreational and educational opportunities to more populated areas within the basin; especially to the more densely populated headwaters in the Berkshires, and the southern portion, along the Coast. Residents of nearby metropolitan areas in New York, Massachusetts and Connecticut also visit the several state parks, state forests and historical sites that dot the central portion of the basin. A national hiking trail, the "Appalachian Trail" runs adjacent to the Housatonic River for about 7 miles before crossing the river three times as it winds northward through the valley. The Housatonic River, and various tributaries offer excellent stream-related recreational activities; the Housatonic River itself is the largest trout stream in Connecticut and sections of the river support Class I, II, III and IV rapids during spring and fall canoeing seasons. In addition, many lakes,

including Candlewood, Lillinonah, Zoar and Bantam Lake, the largest in the basin, offer a wide range of water-related residential and recreation amenities.

The Housatonic Basin supports production of diverse fish, wildlife and botanical habitats which offer a varied population of game and non-game species, most common are white-tailed deer, black bear, rabbit, pheasant and beaver. Rare but also evident in the Basin are wild turkey, peregrine falcon, osprey and the bald eagle. Native trout, large mouth and small mouth bass also abound in the waterways. More information about fish and wildlife is available in the Fish and Wildlife Coordination (Appendix B). The banks, rock ravines, ledges, and adjacent highlands of the river present a number of sites where rare plant species may be found.

The Housatonic Valley offers various outstanding cultural resources including historical sites of state and national significance: the Kent furnace, two covered bridges, an iron bridge, and an old railroad station. Due to an abundance of stratified soils and generally undeveloped streambanks, the Housatonic Basin is regarded to have a high potential of yielding significant archaeological finds.

These proportions of natural and cultural amenities have prompted studies to evaluate portions of the basin for eligibility as a National Wild and Scenic River. Two areas, the Central Housatonic, and the Shepaug River have been determined suitable, but both are yet to be designated.

#### D. Population

Based on the 1970 census, the population of the basin is estimated at 645,000 people, an increase of 85,000, or nearly 18 percent over the 1960 census data. All but 8000 of the increase occurred in Connecticut, especially the southern portion of the basin. Of the total 1970 basin population, Connecticut was estimated to have 531,000 people, Massachusetts 96,000 and New York 18,000.

The major urban centers in the basin, with the exception of Pittsfield, Massachusetts and Danbury, Connecticut, are located in the Naugatuck and lower Housatonic Valleys. While the population of the central cities remained relatively static between 1960 and 1970, the surrounding areas experienced rapid growth. For example, Waterbury increased by only 0.8 percent while the surrounding area grew by 30.3 percent. The most significant growth occurred in the Danbury area where the population increased by 59 percent.

Population data by community is given in Table 1. The largest municipality is Waterbury, Connecticut which has a 1970 population of over 100,000 along with Danbury and Milford, Connecticut and Pittsfield, Massachusetts, which all had populations greater than 50,000.

Projections prepared for the United States Water Resources Council forecast through 2020 a 45 percent population increase for Bureau of Economic Analysis, Area 5. These forecasts are shown on Plate 2.



TABLE 1  
POPULATION OF MUNICIPALITIES  
WITHIN THE STUDY AREA

MASSACHUSETTS

<u>COMMUNITY</u>	<u>POPULATION</u> <u>1960</u>	<u>POPULATION</u> <u>1970</u>	<u>PERCENT CHANGE</u> <u>1960-1970</u>
Alford	256	302	18.0
Dalton	6,436	7,505	16.6
Egremont	895	1,138	27.2
Great Barrington	6,624	7,537	13.8
Hinsdale	1,414	1,588	12.3
Lanesborough	2,933	2,972	1.3
Lee	5,271	6,426	21.9
Lenox	4,253	5,804	36.5
Monterey	480	600	25.0
New Marlborough	1,083	1,031	-4.8
Pittsfield	57,879	57,020	-1.5
Richmond	890	1,461	64.2
Sheffield	2,138	2,374	11.0
Stockbridge	2,161	2,312	7.0
Tyringham	197	234	18.8
Washington	290	406	40.0
West Stockbridge	1,244	1,354	8.8
Windsor	384	468	21.9
Mt. Washington	--	52	-

TABLE 1  
POPULATION OF MUNICIPALITIES  
WITHIN THE STUDY AREA

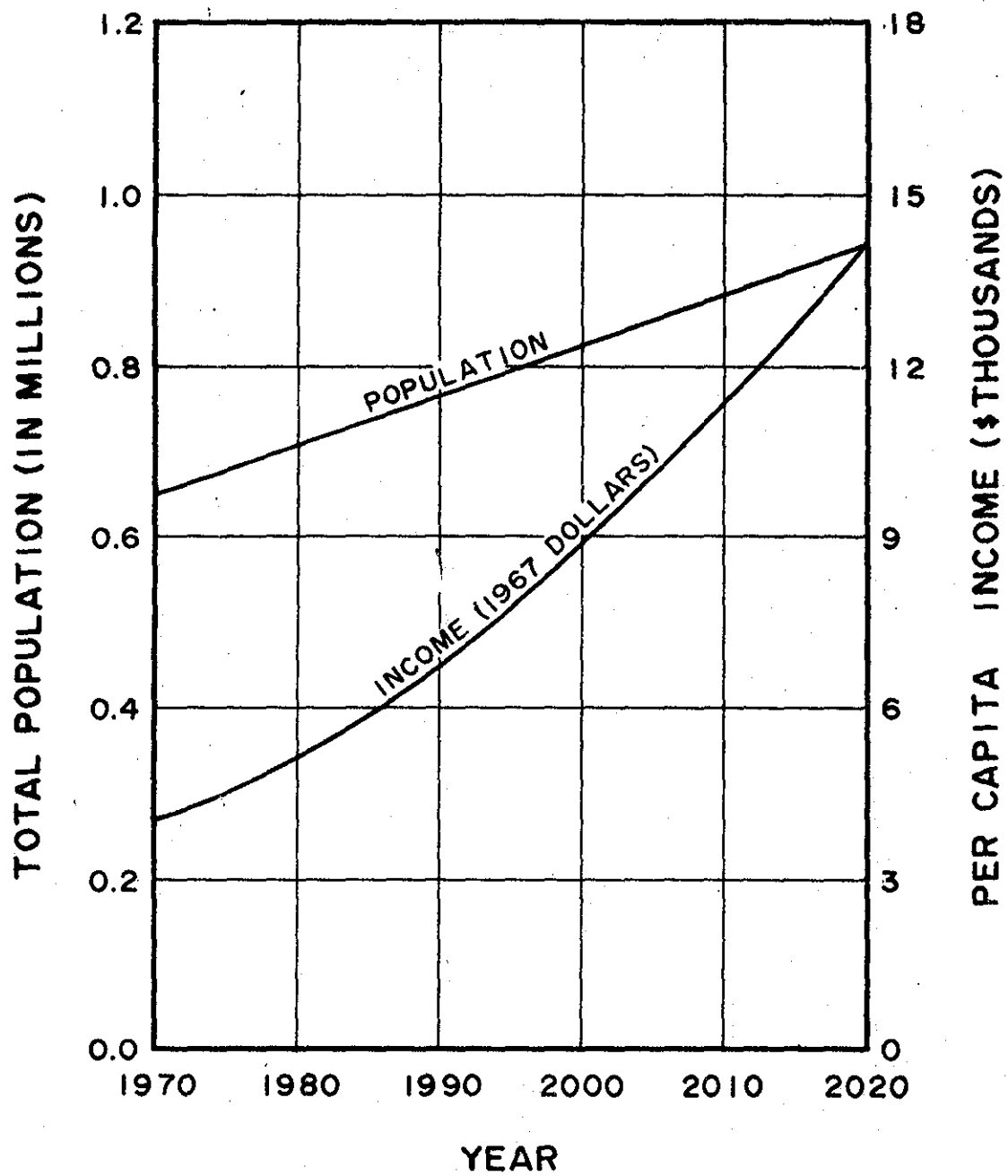
CONNECTICUT

<u>COMMUNITY</u>	<u>POPULATION</u> <u>1960</u>	<u>POPULATION</u> <u>1970</u>	<u>PERCENT CHANGE</u> <u>1960-1970</u>
Ansonia	19,819	21,160	6.8
Beacon Falls	2,886	3,546	22.9
Bethany	2,384	3,857	61.8
Bethel	8,200	10,945	33.5
Bethlehem	1,486	1,923	29.4
Bridgewater	898	1,277	42.2
Brookfield	3,405	9,688	184.5
Canaan	1,146	1,083	-5.5
Cornwall	1,051	1,177	12.0
Danbury	39,832	50,871	29.0
Derby	12,132	12,599	3.9
Goshen	1,288	1,351	4.9
Harwinton	3,344	4,318	29.1
Kent	1,686	1,990	18.0
Litchfield	6,264	7,399	18.1
Middlebury	4,785	5,543	15.8
Milford	41,662	50,858	22.1
Monroe	6,402	12,197	90.5
Morris	1,190	1,609	35.2
Naugatuck	19,511	22,965	17.7
New Fairfield	3,355	6,991	108.4
New Milford	8,318	14,601	75.5
Newtown	11,373	16,942	49.0
Norfolk	1,827	2,073	13.5
North Canaan	2,836	3,045	7.4
Oxford	3,292	4,480	36.1
Plymouth	8,981	10,321	14.9
Prospect	4,367	6,596	51.0
Roxbury	912	1,238	35.8
Salisbury	3,309	3,573	8.0
Seymour	10,100	12,776	26.5
Sharon	2,141	2,491	16.4
Shelton	18,190	27,165	49.3
Sherman	825	1,459	76.9
Southbury	5,186	7,852	51.4
Strafford	45,012	49,775	10.6

TABLE 1 (cont'd)

CONNECTICUT

<u>COMMUNITY</u>	<u>POPULATION</u> <u>1960</u>	<u>POPULATION</u> <u>1970</u>	<u>PERCENT CHANGE</u> <u>1960-1970</u>
Thomaston	5,850	6,233	6.6
Torrington	30,045	31,952	6.4
Warren	600	827	37.8
Washington	2,603	3,121	19.9
Waterbury	107,130	108,033	0.8
Watertown	14,837	18,610	25.4
Wolcott	8,889	12,495	40.6
Woodbury	3,910	5,869	50.1



NOTE:

Data based on OBERS Projections, 1972 Series E

### E. Urban Study Area

Based on a survey in 1970 by the U.S. Department of Commerce, Bureau of the Census, Massachusetts and Connecticut have the third and fourth highest population densities in the country. Six Standard Metropolitan Statistical Areas (SMSA) are located either wholly or partially within the study area. These SMSAs are Danbury, Bridgeport, New Haven, Waterbury and Bristol, Connecticut and Pittsfield, Massachusetts, data given in Table 2 and their location is shown graphically on Plate 3.

As shown on Table 2, these six SMSAs include about 30 percent of the region's total land area and contain over 70 percent of the 1970 population.

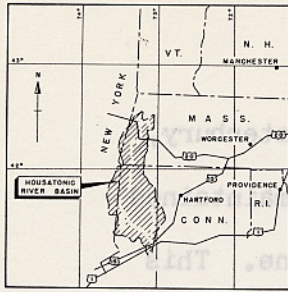
TABLE 2

#### PERTINENT DATA

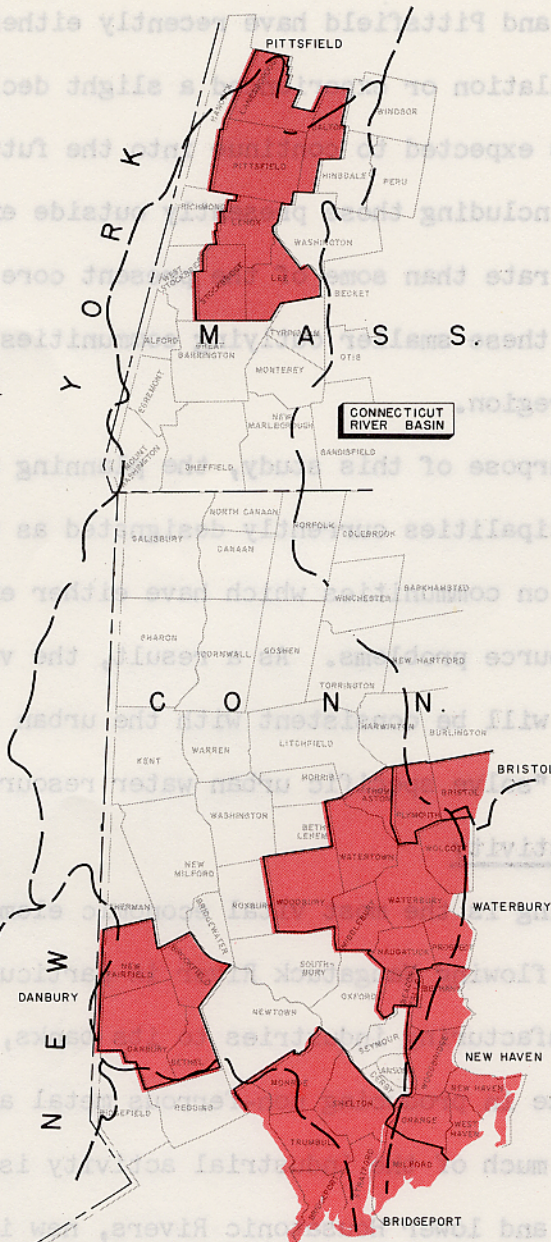
Standard Metropolitan Statistical Areas (SMSA)  
within Housatonic River Basin Study Area Boundaries

<u>SMSA</u>	<u>Area Sq. Miles</u>	<u>1970 Population</u>	<u>1970 Density Population/sq. mile</u>
Danbury	99.3	78,405	790
Bridgeport	70.4	90,765	1290
Waterbury	181.1	189,222	1033
New Haven	15.3	4,819	315
Bristol	18.4	12,877	706
Pittsfield	140.3	77,579	553
TOTALS	526.8	435,677	





LOCATION MAP  
SCALE IN MILES  
0 10 20 30 40



LEGEND

- BASIN BOUNDARY
- STATE BOUNDARY
- MUNICIPAL BOUNDARY
- STANDARD METROPOLITAN STATISTICAL AREAS (SMSA)

SCALE IN MILES  
0 4 8 12

HOUSATONIC RIVER BASIN  
URBAN STUDY  
SMSA BOUNDARIES

DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
WALTHAM, MASS.

Relatively dense areas such as the cities of Waterbury, Torrington, Ansonia and Pittsfield have recently either maintained a fairly stable population or experienced a slight decline. This pattern of change is expected to continue into the future with outlying communities (including those presently outside existing SMSAs) growing at a faster rate than some of the present core urban areas. As a result many of these smaller outlying communities will play a larger role in the region.

For the purpose of this study, the planning area will focus on those municipalities currently designated as urban, with particular emphasis on communities which have either existing or potential water resource problems. As a result, the various plans which are developed will be consistent with the urban studies' program's objective to "solve specific urban water resource problems."

#### F. Economic Activity

Manufacturing is the most vital economic element in the basin. The rapidly flowing Naugatuck River in particular has attracted water-using manufacturing industries to its banks, especially those that specialize in producing non-ferrous metal and rubber products. Although much of the industrial activity is still located along the Naugatuck and lower Housatonic Rivers, new industrial parks on major transportation routes have attracted new or relocated industries.



Likewise, the construction of suburban shopping centers has stimulated and dispersed economic activity, reducing the relative importance of the central cities as centers of commerce and industry.

More than 40 percent of the labor force in the Naugatuck and lower Housatonic Valleys is employed in manufacturing industries. In the more rural areas, only 20 to 30 percent is employed in similar industries. Median family income tends to be less in manufacturing centers such as Waterbury, where it is between \$10,000 and \$11,000 per year. On the other hand, the relatively affluent non-manufacturing centers such as Danbury had a median family income of \$12,600.

During the period from 1950 to 1970, the region's manufacturing industries experienced a decline. (The greatest growth was experienced by the services and financial sections). The trend is expected to continue into the future with the services industry increasing dramatically and off-setting declines in the manufacturing sector. Information on the Bureau of Economic Analysis, Area 5, is shown in Table 3.

Tourism is a vital economic feature in the sparsely populated upper and middle portions of the basin. These areas prosper monetarily during the summer season when vacationers gravitate to the numerous lakes and ponds, hence, bolstering the economy. Principal summer resort centers include Lenox, Lee, Stockbridge and Great Barrington, Massachusetts and Newtown and New Milford, Connecticut.



TABLE 3  
PERCENT CONTRIBUTION OF REGION'S INDUSTRIES  
(1)  
TO TOTAL EARNINGS

<u>SECTOR</u>	<u>1950</u>	<u>1970</u>	<u>1990</u>	<u>2020</u>
Agriculture, Forestry and Fishing	3.77 (9.11)	1.31 (3.49)	0.66 (1.96)	0.34 (1.10)
Mining	0.09 (1.99)	0.12 (1.00)	0.09 (0.62)	0.06 (0.37)
Contract Construction	5.24 (5.97)	7.00 (6.13)	6.40 (6.06)	5.74 (5.53)
Manufacturing	45.72 (29.01)	36.89 (27.79)	28.12 (24.78)	21.45 (21.39)
Transport, Communication & Public Utilities	5.36 (8.17)	5.06 (7.10)	5.46 (6.90)	5.55 (6.68)
Wholesale & Retail Trade	15.37 (18.94)	14.52 (16.55)	13.75 (15.22)	12.42 (13.65)
Services	10.08 (11.18)	14.74 (15.13)	22.15 (19.94)	28.58 (23.49)
Professional Services	- (-)	10.51 (9.28)	17.37 (13.75)	- (17.51)
Government	9.07 (11.39)	13.70 (17.66)	15.24 (18.37)	23.02 (19.97)
Finance, Insurance & Real Estate	5.39 (4.23)	6.66 (5.14)	8.12 (6.15)	8.96 (6.81)

(1) OBERS Projections, 1972, Series E

Figures in parentheses are percent of United States Values

## G. Description of Existing Problems

### 1. Overview

A list of problems and needs considered by this urban study which currently exist within the region's urban areas is given in the following paragraphs. The items shown have been gathered from discussion with Federal, State, regional and local officials. The items discussed are not all inclusive of the problems and needs which exist in the study area. Undoubtedly, others will be indentified as the study progresses, but the list shown does provide a backdrop against which this Reconnaissance Report.

Within the study area's urban sections, the major existing problem areas are reported to include the following: water supply, wastewater management, inland flooding, coastal flooding and recreation. The prime emphasis of this urban study, therefore, will be directed toward these problem areas.

The States of Massachusetts and Connecticut have assumed responsibility for wastewater management planning in the study area through the Section 208 planning program. These efforts will be coordinated with the urban study to insure a two-way flow of information. In this manner, decisions will be based upon the impacts of those decisions on other purposes, thus allowing a more complete water resource plan for the region. The remaining problem areas, namely, water supply management, recreation, inland flood control and floodplain management and coastal flood control, will be included in this urban study and are discussed in the following paragraphs.

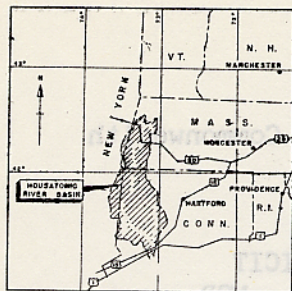
Water supply problems exist in three of the study area's SMSA's and contiguous places. The Danbury SMSA, and the Ansonia-Derby-Seymour area in Connecticut, as well as the Pittsfield SMSA in Massachusetts have been identified with this problem.

## 2. Water Supply Management

In 1975, public water supply systems within the Housatonic River urban study area supplied about 130 million gallons per day (mgd) to about 75 percent of the people living in the region. Preliminary estimates of future supply requirements indicate an increase to 180 mgd by the year 2000 and 250 mgd by 2030. At present, total available supplies in the region reportedly have a capacity of 200 mgd with about 145 mgd from surface reservoirs and the balance from groundwater wells. This existing yield, however, is not equally available to all urban areas. Hence, although some serviced urban centers have adequate supplies in terms of future needs, a great many more face future shortages unless additional supplies become available or demand is modified to meet available supply. In the following paragraphs, the water supply situation in each of the region's SMSAs is reviewed. Urban centers which may require augmentation of their supply source by the year 2000 are shown on Plate 4.

The Pittsfield SMSA, located in the Massachusetts portion of the Housatonic River Basin, has sufficient water resources to meet projected water supply needs. The projected 2000 water supply deficit, 2.46 mgd, can be supplied by either groundwater development or by small surface - water reservoirs.





LOCATION MAP  
SCALE IN MILES  
0 10 20 30 40



42° 00'

41° 30'

41° 00'

73° 30'

73° 00'

41° 30'

41° 00'

HUDSON RIVER BASIN

HUDSON RIVER BASIN

CONNECTICUT RIVER BASIN

CONNECTICUT COASTAL AREA

CONNECTICUT COASTAL AREA

- LEGEND**
- BASIN BOUNDARY
  - - - STATE BOUNDARY
  - MUNICIPAL BOUNDARY
  - 2000 WATER SUPPLY PROBLEM
  - 100 - YEAR FLOOD DAMAGE AREAS

SCALE IN MILES  
0 4 8 12

HOUSATONIC RIVER BASIN  
URBAN STUDY  
PROBLEM IDENTIFICATION  
DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
WALTHAM, MASS.

The municipal water supply deficits in the Commonwealth of Massachusetts by 2000 are projected to be:

<u>COMMUNITY</u>	<u>APPROXIMATE DEFICIT AVERAGE DAILY USE - MGD</u>
Pittsfield	1.30
Lenox	0.56
Lee	0.37
Monterey	0.13
New Marlborough	0.05
Sheffield	0.05
	<hr/>
TOTAL	- 2.46

This portion of the basin has an abundance of water and approximately five percent of the total runoff, surface-water and ground-water is used for domestic, industrial, agricultural or other purposes.

The cities and towns have developed both surface-water and groundwater sources for water supply. Generally, the major industries depend on their own supplies, usually groundwater, for most of their water needs. Supplementary sources include municipal systems and direct river intakes.

Preliminary findings of a testing program presently underway by the State of Massachusetts have revealed traces of PCB's (Polychlorinated Biphenyls) in segments of the river and in certain ground-



water deposits, and in both valley and upland communities. The testing program and analysis are not yet complete. As a result, the State has issued a warning that no fish or other wildlife taken from the Housatonic River should be eaten. The severity of the problem and what remedial measures may be needed, or what they might cost, is not known at this time.

The water supply problem in the upper Housatonic River Basin is, therefore, one of quality and not of quantity.

In the Danbury SMSA, only one community, Brookfield, is reported to have existing supplies adequate to meet their short term (2000) needs. The other three communities in the SMSA, Danbury, New Fairfield and Bethel, will require additional supplies to meet their estimated supply requirements. By the year 2000, initial estimates indicate that the communities within the Danbury SMSA will increase their average daily demand to about 15 mgd from the 1975 output of about 8.5 mgd. Although currently available yield is estimated to be approximately 13 mgd, the location of supplies in many cases does not coincide with need areas and the communities in the region are finding it increasingly difficult to locate future water sources within their jurisdictions.

In the Bridgeport SMSA, the Bridgeport Hydraulic Company, which serves over 95 percent of the residents, is reported to have existing supplies adequate to meet their short term (2000) needs. The demand will increase from the present 60 mgd to an estimated 84 mgd by the year 2000. Shortly after that date, new supplies will be required.

In the Waterbury SMSA, the city of Waterbury's water supply department is the largest system, delivering an average of 21 mgd drawn from surface water sources. Within this SMSA the total 1975 water use was about 26 mgd, and this figure is expected to rise to about 35 mgd by 2000. Three of the communities in this area have sufficient supplies to meet their estimated needs, while the remaining communities, Middlebury, Naugatuck, Beacon Falls, Prospect and Wolcott, will require additional supplies to meet their projected short term (2000) demands. Woodbury is the only community that will not require any additional supplies throughout the entire study period (2030).

Urban areas not specifically within the SMSA boundaries include the Ansonia-Derby-Seymour areas and the Torrington-Litchfield area. Ansonia, Derby and Seymour are highly populated towns which supply 6.7 mgd to about 87 percent of the population. By 2000, it is estimated they will be required to supply about 11 mgd. Currently, available yield within these towns is estimated to be about 9 mgd.

In the Torrington-Litchfield area the situation is much the same as elsewhere in the study area; the demand will rise from the present 4.6 mgd to the estimated 6 mgd by 2000. These towns will also require additional sources of supply since their present yield is only 5 mgd.

The municipal water supply deficits in the State of Connecticut by 2000 are projected to be:

<u>COMMUNITY</u>	<u>APPROXIMATE DEFICIT AVERAGE DAILY USE - MGD</u>
Seymour - Beacon Falls	1.34
Torrington	.94
Middlebury - Southbury	.77
Danbury	1.20
Ansonia - Derby	.35
Wolcott	.30
New Fairfield	.24
Bethel	.77
Kent	.17
Prospect	.14
Litchfield	.13
	<hr/>
TOTAL	- 6.35

### 3. Flood Control and Floodplain Management

As described earlier, one of the major problems in the Housatonic River Basin urban study area is inland flooding. Three of the six SMSA's located partially or wholly within the study area have recorded significant flood damages. These are Pittsfield in Massachusetts and Danbury and Bridgeport in Connecticut.



Communities classified as inland flood damage centers are shown on Plate 4. Flooding within the SMSA's has varied to some extent as discussed below. However, a common problem facing the urban areas is that future urbanization and encroachment on the floodplains can increase flood damages if this development is not carried out cautiously. The situation discussed below, therefore, can be considered as a "Base Condition." As the urban study progresses, and projections are made regarding future growth, other areas will be identified as potential trouble spots.

The recently completed investigations in Berkshire County indicate that a potential for severe flood damage exists in the upper Housatonic River Basin. Damage resulting from a 100-year frequency flood is estimated to be over \$7.4 million. In addition to the homes, commercial buildings, industrial plants, roads and bridges affected by a major flood, recent commercial development of the river flood plains has greatly increased the damage potential over the most recent major flood which occurred New Year's Eve 1948-49. Average annual flood damages are estimated at about \$446,000. Over 80 percent of the damage would likely occur in Pittsfield, Lenox, Dalton and Hindsdale.

Preliminary investigations completed of the 100-year flood plain indicate that the potential flood problems in Connecticut involve small commercial establishments and summer cottages. The poten-

tial flood areas are located in and around the Danbury, SMSA at Kent, New Milford, Brookfield and Danbury and around the Bridgeport SMSA at Newtown, Southbury, Oxford, Seymour, Derby and Shelton. Past studies indicate that the total cost resulting from damage to these types of structures is usually not of a magnitude that would justify the construction of protective measures.

#### 4. Coastal Area Protection

Tidal flooding has been identified as a potential problem in Stratford and Milford, Connecticut at the mouth of the Housatonic River. Flooding, occurring as a result of a 100-year storm, would be widespread in primarily residential areas. To date, no damage estimates have been made of the 100-year flood but, in certain areas of Milford, minor coastal flooding occurs almost annually.

#### 5. Recreation

The Regional Planning Agencies throughout the basin have indicated that additional water recreation facilities are needed and there is a local desire to determine the feasibility of acquiring flood plain lands along the Housatonic River as green belts for various recreational purposes. The Connecticut Departments of Environmental Protection and Health have identified a PCB (Polychlorinated Biphenyls) contamination problem in sediments and fish in the Housatonic River which has prompted the Department of Health to advise citizens not to eat fish taken from the river from the Connecticut/Massachusetts state line to the Shepaug Dam on Lake Lillinonah.

The Department of Environmental Protection suggested that a study be made to determine the effect of the current problems with PCB's in the Housatonic River on total recreational use in the basin. Some vague estimates have been made on its effect on trout fishing; however, a secondary effect on camping, picnicing, tourism, etc. should be documented.

#### H. Study Planning Objectives

##### 1. General

Through the urban studies program the Corps seeks plans which not only provide solutions for specific urban water resources problems, but also offer the potential to aid other related urban problems. In this regard, the Corps' urban water resource planning must be consistent with national objectives of developing, in conjunction with the public, plans which serve the dual purpose of solving water resource problems and related urban problems.

##### 2. National Objectives

Water resources planning undertaken by Federal agencies is directed by the Principles and Standards for Planning Water and Related Land Resources of the Water Resources Council. These principles provide the basis for Federal participation with river basin commissions, state agencies and other concerned groups in developing regional plans for the use of water and related land resources to meet short and long term needs. Regional plans will, therefore, be developed by enhancing national economic development (NED) and national environmental quality (EQ). Economic development is enhanced by increasing the value of the nation's output of goods and services and by improving national economic

efficiency. The quality of the environment is enhanced by the improved management, conservation, preservation, creation or restoration of certain natural and cultural resources and ecological systems. The study will focus on these overall objectives as well as evaluate the effects of regional development and increased social well being.

The measures will be fully considered in each alternative water resource plan developed to provide appropriate consideration of needs and means for the following: an adequate source of municipal and industrial water supply; protection against inland flooding and the wise use of flood plains; protection against coastal flooding and development of water-related facilities. Wastewater management (Section 208) planning in the study area, presently being conducted by various regional planning agencies, will be incorporated with all other elements of this urban study with the results incorporated in the final water resource alternatives.

### 3. State Objectives

Connecticut's water and land use policies and objectives are discussed in the Plan of Conservation and Development. Recognizing the hazards of uncontrolled growth, this document designates land use patterns which allow for population growth and economic expansion that is cognizant of environmental limitations on development. In order to preserve scenic, undeveloped areas, the Plan of Conservation and Development encourages expansion in existing urban centers or adjacent areas where the necessary support services such as transportation, water and sewers can be provided at minimum cost.

The specific objectives outlined in the Plan of Conservation and Development include the following: the establishment and protection of water supply sources sufficient to meet future water supply needs; provision of a variety of high quality outdoor recreational opportunities, with highest priority given to the purchase and development of facilities in and near the State's urban areas; protection of scenic, historic and natural resources from premature, uncontrolled or incompatible development; protection of rivers and lake shores, flood plains and coastline from environmentally destructive alterations and development; directing urban development to those areas identified as "Urban Growth Areas," preferably close to existing urban, commercial and employment centers; encouraging urban development to be at sufficient densities for the economic provision of services; promoting staged, contiguous development within areas "Urban Growth Areas"; and encouraging local participation in conservation and development activities.

#### 4. Specific Planning Objectives

Based upon a preliminary assessment of the water resources issues, problems and opportunities in the study area, specific planning objectives have evolved. A list of objectives was compiled from meetings with State, regional and local officials, and is based upon information collected to date. Definitive planning objectives will emerge as the study progresses and will be incorporated in the iterative planning process.

5. Inland Flood Control and Floodplain Management

a. Detailed identification, delineation and assessment of those flood-prone areas illustrated on Plate 4 and described below.

b. The formulation of alternatives to reduce flood damage potential in the following areas:

- (1) Pittsfield SMSA - particularly in Pittsfield, Lenox, Dalton and Hindsdale.
- (2) Danbury SMSA - particularly in Danbury and Brookfield.
- (3) Bridgeport SMSA - particularly Shelton, Stratford, Milford and Monroe.
- (4) Waterbury SMSA - particularly Woodbury.
- (5) Seymour and its environs - Oxford, Southbury, Newtown and Derby.
- (6) New Milford and Kent.

6. Water Supply Management

a. A detailed assessment of the adequacy and suitability (quality) of available water supply resources will be studied relative to the short-range 2000 and long-range 2030 needs of urban communities within the region. The quality of water supplies will be evaluated in context with the standards set by the "Safe-Drinking-Water Act" (PL 93-523).

b. The development of a regional management plan will be considered, including an identification and evaluation of both structural and non-structural measures which could be used to satisfy future

municipal and industrial water requirements. Initial estimates indicate about 56 mgd of additional water by 2030 may be needed by urban municipalities within the region. Communities which have been identified to date as requiring additional water by 2000 are shown on Plate 4 and described below.

- (1) Pittsfield SMSA - particularly Pittsfield, Lee  
Lenox and Monterey.
- (2) Sheffield and New Marlborough.
- (3) Danbury SMSA - particularly Danbury, New  
Fairfield and Bethel.
- (4) Waterbury SMSA - particularly Middlebury, Beacon  
Falls, Prospect and Wolcott.
- (5) Seymour and its environs - Ansonia and Derby.
- (6) Torrington, Kent, Litchfield and Southbury.

c. Determination if additional sources of supply may be feasible due to water quality management developed by the Section 208 planning program.

d. Also evaluated will be the effects of existing legal authorities concerning the allocation of the water resources leading to development of an overall management plan, which when coupled with above tasks, will insure an adequate supply of safe drinking water to the urban municipalities.

#### I. Current Planning and Related Data

Within the urban study area there are a number of Federal, State, regional and local agencies currently engaged in water resources planning activities. There exists a significant amount of data related



to planning in the study area including comprehensive Level A and B regional water resources studies, Section 201 waste treatment facilities plans and, of course, the on-going Section 208 areawide waste treatment management studies.

To avoid duplication of the study effort, extensive use will be made of the results of these existing and on-going studies and reports conducted throughout the area. Additional information will be developed and utilized in this study and as input for other related planning efforts currently being undertaken. Some of the more recently completed major planning studies pertinent to this urban study are summarized in the following paragraphs.

1. Interagency

The North Atlantic Regional Water Resources study (NAR) was one of the 20 regional comprehensive water and related land resources studies conducted throughout the United States under guidelines established by the Water Resources Council. The NAR study was authorized by the 1965 Flood Control Act (Section 208, Public Law 89-298) and completed in 1972.

The NAR study area included the Housatonic River basin within "Area 10 - Thames and Housatonic River basin." The information and data for this area also includes the Connecticut coastal drainage system. More often than is desirable, the information and data concerning the Housatonic River is not separable from the data for the entire area. This factor necessitates review of background information and interpolation of published data to provide specifics regarding the basin.

2. Federal

a. Corps of Engineers, North Atlantic Division

The Northeastern United States Water Supply (NEWS) study was authorized under Public Law 89-298. It directed the Secretary of the Army, acting through the Chief of Engineers, to cooperate with Federal, State and local agencies in preparing plans to meet the long range water needs of the Northeastern United States.

The NEWS study area includes the Housatonic River Basin, but in depth studies have included only that area which lies within the Western-Connecticut portion of the New York Metropolitan area and its service area (including all of Fairfield and New Haven counties).

b. Corps of Engineers, New England Division

The Housatonic River basin is within the geographical jurisdiction of the New England Division. Flood control projects on the Still and Naugatuck Rivers and a flood plain information study for the Naugatuck River has been completed.

c. Department of Interior

The U.S. Geological Survey has initiated groundwater studies in the Naugatuck Valley area to estimate long-term water supply yields. Earlier preliminary groundwater studies of a reconnaissance nature have been completed for the Housatonic basin and the reports are on file.

d. Department of Agriculture

In March 1977, the U.S. Department of Agriculture, in cooperation with the Massachusetts Water Resources Commission, completed a study of the water and related land resources of the Berkshire

Region, including the Massachusetts portion of the Housatonic basin. The report identifies problems, needs and alternative solutions in the following resource areas: land use, flooding, erosion and sediment recreation, fish and wildlife, wetlands, water supply and water quality.

e. New England River Basins Commission

A Federal/State interagency study of the Long Island Sound region was conducted under the general direction of the New England River Basins Commission and a Federal-State study management team.

In Connecticut, the study area included the towns encompassed by the five coastal regional planning agencies. Therefore, that portion of the Housatonic River basin, which lies within the Greater Bridgeport and the South Central Connecticut Regional Planning Agencies was included.

The study consisted of the following phases: an inventory analysis of existing data and previous reports on the study area; the development of plans and suitable alternatives for each of the many uses of the area resources; and the blending of these plans into comprehensive recommendations for the years 1990 and 2020.

3. Interstate

a. Tri-State Regional Planning Commission

This commission conducts inventories and studies of the tri-state region as a whole. It is currently involved with tasks such as mapping the areas sewered, the water supply service areas and the sources of water supply.

4. State of Connecticut and Commonwealth of Massachusetts

The current planning programs for both states are presented by the water resource functional area.

a. Wastewater Management

Areawide waste treatment management planning under Section 208 of PL 92-500 is being conducted by Connecticut's Regional Planning Agencies. The Berkshire County Regional Planning Commission has recently completed their Section 208 work efforts in Massachusetts.

b. Water Supply

The State of Connecticut has formulated preliminary plans for developing a number of water supply sources in the Housatonic Basin to be implemented as the need becomes necessary. Alternative sources of supply were considered and narrowed down to the present number of recommendations. These recommendations were formulated within the Plan of Conservation and Development and in Phases I and II of the Connecticut Water Resources Planning Project. The recommendations were developed based on State Law and the State Public Health Code, restricting waste receiving streams from use as water supply sources. Phase III of the water resources planning project is presently being developed through the Title III program.

These recommendations, consisting of 90 key sites of water supply located throughout the State have an estimated safe yield totalling 310 mgd. Twenty-six of these sites are located in the Housatonic Basin and four are considered to be needed in the near future (priority).

c. Flood Control and Flood Plain Management

The most serious flooding threats in the Housatonic Basin have been alleviated by Corps' flood control reservoirs and local structural protection, particularly along the Naugatuck and Still Rivers. Problems of delineating the flood plain and then regulating its development remain. Some flood plain delineation work has been accomplished through the Corps' Flood Plain Information Program, HUD's Flood Insurance Program and SCS's Streambelt Projects.

d. Navigation

There are few navigation problems on the Housatonic River and any problems that do exist are addressed in NERBC's Long Island Sound Study, other on-going programs and by the State's Coastal Zone Management Program.

e. Water Related Recreation

Water related recreation is addressed by the Statewide Comprehensive Outdoor Recreation Plans, (SCORP). Connecticut's proposed Plan of Conservation and Development, and respective regional land-use plans which have established the need and have presented programs and projects to meet these needs.

J. Public Involvement Strategy

1. General

A vital part of an effective planning process is public participation. The development and subsequent implementation of sound urban water resources plans is keyed to how effectively the public has

been involved in all phases of the study progress. Such participation assists planners in defining study objectives and priorities and develops channels through which ideas and information can be shared by all participants.

In the broadest sense, the "public" consists of all non-Corps of Engineers entities, involving Federal, State, local and regional agencies, as well as public and private organizations, including the general public. Initial identification of the "public" has been made during the preparation of this Plan of Study and may generally be categorized into three distinct, yet related, groups consisting of the governmental sector, special interest groups and the general public.

The primary objective of the public participation program is to provide a continuous two-way communication process maximizing the opportunity for the public to be involved in the overall planning process, to be aware of the study's progress and to assist in the making of decisions which would have impacts on the lives of those in the study area. Inasmuch as major decisions made throughout the conduct of the study will be based upon the expressed needs and objectives of all local, county, State and regional officials together with those of the general public, it is necessary to establish a mechanism to channel information concerning the study to interested participants and to focus their response to those conducting the study.

The program set forth below is designed to involve the public in all phases of the planning process to insure that the final output represents the desires and needs of those affected.

## 2. Objectives

General public involvement objectives have been established to provide a planned program for exposure of the public to the planning process and to insure that their interests and desires are considered and acted upon. The objectives are as follows:

- Present information which will provide assistance to the public in the definition of water and related land resources problems within the study area and the concerns, objectives and priorities of its citizens in the understanding of the planning process and responsibilities in defining how they may effectively participate in the study.
- Foster an understanding among study participants in which free exchange of ideas is possible, and develop channels through which public concerns, preferences and priorities will be heard and considered.
- Develop a structure to allow opportunity for the public to influence the formulation and evaluation of planning alternatives, to identify and resolve conflicts where they may arise and attempt to achieve consensus on all study courses of action.
- Establish a control system which is flexible and can be modified in response to the study needs as they are identified.



- Establish a system of coordination between the urban study and other water resources planning efforts of other Federal, State, regional and local agencies.

### 3. Public Involvement Interactions

Implementation of the public involvement program will occur during each stage of the study. The program is structured to provide the public with a better understanding of the entire planning process as the study progresses from one stage to the next. The preparation of this Reconnaissance Report (Stage 1), Development of Intermediate Plans (Stage 2), and Development of Final Plans (Stage 3) requires the iteration of planning activities at successively greater levels of detail, effort and refinement. Each stage will be conducted by carrying out the four functional planning tasks of problem identification, formulation of alternatives, impact assessment and evaluation during plan development.

The public involvement program for each of these tasks will be conducted generally as follows:

#### a. Problem Identification

During the problem identification, public involvement efforts will be programmed to:

- Inform and educate the general public and specific publics about the study effort being undertaken.
- Obtain data which will assist in the identification and description of resource management problems, concerns and opportunities.

- Obtain an indication of the relative priority of planning objectives from a public point of view.
- Solicit information concerning the public's environmental, social, and economic desires.
- Obtain public review and reaction to the results of problem identification.

Specific work tasks will include:

Preparation of a list of "publics" to be contacted.

Preparation of an information fact sheet and other study announcements and brochures.

Preparation of materials for workshops, seminars, interviews and speaking engagements.

Preparation of a list of repositories for study documents.

Analysis of feedback.

Evaluation of the effectiveness of the public involvement program.

Implementation mechanisms to be used during problem identification include mailings and media presentations, briefings of officials and leaders, public meetings, and the Study Advisory Group. This body will have the function of helping to direct the general course of the study. In addition, the group will aid in coordination of local planning inputs to serve as a representative for various local interests, and meet periodically to review and monitor progress.

b. Formulation of Alternatives

Public involvement during this planning activity will aid in assuring that the alternatives developed address the full range of problems and concerns as perceived by the public in response to stated planning objectives. Specific public involvement objectives during this phase will include the following:

Inform the public and obtain their feedback about the various technological and managerial measures available for meeting stated objectives.

Obtain public review of and reaction to alternative measures and plans. Specific work tasks to be accomplished during the formulation of alternatives will include preparation of materials, including brochures on alternative programs; preparation for workshops; dissemination and presentation of materials to identified publics; and analysis and evaluation of the program.

Implementation mechanisms to be utilized during this phase of the planning endeavor will include oral presentations to various groups and organizations, the information fact sheet, workshops, public meetings, information meetings and meetings with the Advisory Group.

c. Impact Assessment

Public involvement during impact assessment will focus on identification and measurement of the impacts of water resources plans as they relate to the entire study area and the general public. Sub-

stantial public involvement will be utilized so that the public will understand each alternative plan and its impacts. Major objectives of public involvement during the impact assessment phase are to:

- Obtain information about interest groups, primarily those concerned with each class of impacts in order to identify those groups and individuals to be specifically consulted during evaluation.
- Describe the elements and impacts of each alternative plan and obtain public input on the significance of impacts to each affected interested group.
- Obtain additional input for each succeeding iteration.

Work tasks to be accomplished include the preparation of materials describing concepts used in impact assessment, dissemination of materials on impact alternatives, solicitation and recording of reactions and preferences concerning impact of alternatives, and interpretation of public reaction.

In the assessment phase, brochures displaying the impact of the various alternatives, oral presentations to interested groups, public forums, and meetings with the Advisory Group will be used.

d. Evaluation

Specific public involvement objectives during the evaluation of alternative plans will include the following:

- Obtain public input concerning the acceptability of alternative plans.
- Rank alternatives in terms of their contribution to planning objectives and public acceptability.
- Allow publics to discuss disagreements, if any, with a goal of arriving at a mutually agreeable solution.
- Summarize information on the evaluation of alternative plans.

In addition to formal public meetings, both progress and informational meetings will be held to maintain close cooperation of study elements with all study participants and to inform the public of day-to-day progress. The progress-type meetings would be a working session of the Study Management Group consisting of study members and representatives of state and regional water resource planning agencies, as well as interested members of other "publics." Based upon experience gained from various other studies conducted by the New England Division, these progress meetings would be held generally on a bi-monthly basis. Such procedure will afford study participants an opportunity to discuss the study, focus attention on specific water resource issues that will be addressed, analyze the legal and institutional framework that will be required for plan implementation, as well as provide a means of ready access to additional study materials as needed.

Information on workshop meetings will primarily consist of two types. The first type will be with public groups to provide a combination of public information and interaction. Meetings of the Study Advisory Group would fall into this category. The second type of informational meeting will be conducted at the request of any small group from all sectors of the public. These meetings would provide a ready source of information regarding specific issues, as well as to provide a further means of study publicity and public acceptance.

Work tasks to be undertaken include: preparation of materials dealing with the overall objective of program analysis and the concept of trade-off analysis, presentation and display of plans, final impact comparisons, program and systems, solicitation and documentation of reactions and preferences, interpretation of public reaction, and meeting with publics to establish final decisions on plans and programs.

Implementation mechanisms will include centrally located information, depositories, progress meetings, information meetings, workshops, and public meetings.

e. Public Meeting Schedule

During the course of the urban study, there will be area-wide public meetings held where the public can officially participate, ask questions, and express their opinions. In selecting meeting locations, emphasis will be given to those areas which would be most affected by the various water resource alternatives.

The format for the public meeting will consist of a presentation by the Corps of Engineers and, where applicable, by representatives of the Section 208 planning programs and State agencies involved in water resources planning. These presentations will then be opened to public discussion and the study team will respond to questions from the public. The public meetings are as follows: Initial Public Meeting (if necessary); Plan Formulation Public Meetings; Late Stage Public Meetings.

f. Coordination

The public involvement program proposed for the Housatonic Urban Study will be closely coordinated with other water resources planning efforts being conducted by local, regional, state, interstate, and Federal agencies. Close coordination has been maintained and will continue to be maintained with regional agencies engaged in Section 208 water quality planning in the study area. Presently, the Corps of Engineers serves on the technical advisory committees of all agencies conducting 208 planning programs, and this coordination will be maintained so that public involvement activities for the urban study are complementary to those of the water quality programs. The regional planning agencies will have primary responsibility for conducting public involvement activities associated with the Section 208 work programs, however, it is anticipated that the Corps will provide assistance to these agencies in developing written materials, conducting workshops, and holding public meetings where it is deemed mutually advantageous to both planning programs. For the remaining elements of the urban study, such as water supply, flood control, and flood plain management, the Corps will have responsibility for conducting the public involvement activities in cooperation with the States of Connecticut and Massachusetts.

K. Institutional Arrangements

1. General

The intent of the urban studies program is to provide urban water resource plans that are compatible with comprehensive urban development goals of the region under study. To this end, the urban



study will develop alternative urban water resource plans from which one may be selected for implementation. To insure that each water resource alternative developed in the study is indeed implementable, a thorough analysis of the institutional structure required for such implementation must be undertaken.

By definition, an "institution" is a process or organization that is highly structured, systematized, and stable. Institutional structures may, therefore, be organizations such as planning agencies, water commissions, sewer boards, or special interest groups; or they may be formalized practices or procedures such as home rule, tax structures, or financial obligations. "Institutional analysis" is a process whereby institutions, directly or indirectly related to water resources planning and management, are identified and their capability to implement alternative plans is assessed. "Institutional arrangements" are those tasks or procedures which suggest how existing institutional structures should be utilized, or modified, new institutions created, or existing institutions abandoned in order to facilitate implementation of the plan.

## 2. Analysis Procedures

Institutional analysis parallels the overall planning process, moving from broad collection to specification of detailed institutional arrangements for implementation of the urban water resources alternatives. The urban study will define certain problems or issues within the study area and develop technical alternatives for solutions to those problems. Institutional arrangements designed specifically to implement the alternatives will then be recommended. Specific tasks to be undertaken in the institutional analysis are:

a. Establishment of an institutional data base, including an inventory of existing agencies and agency types.

b. Analysis and evaluation of institutional capabilities to implement the water resources plans developed in the study, including organizational information, scope of operation, financial strength and capacity, jurisdiction, and relationship with public interest groups and other agencies.

c. Development, presentation, analysis and evaluation of alternative institutional arrangements and implementation strategies.

Inasmuch as institutional analysis is a problem-oriented process, the analysis to be conducted as part of this study will concentrate on those institutional structures directly associated with the problem. Assessment of existing institutional capability to implement the alternative plans and recommendations for modifications, to make such institutions more effective, will naturally follow. Study emphasis will be placed on evaluation of the continuance or modification of existing institutions rather than the creation of new ones. Overall, institutional analysis will focus on the organizational and financial analysis of government agencies, primarily at the local level, as water resources management in the study area is predominantly a local government responsibility.

### 3. Existing Institutions and Trends

Although Federal and interstate government agencies perform various functions, it is state and local governments that share the major responsibility for water resources planning, regulation, technical

and financial assistance, and policy development. Similarly, the more prominent interstate bodies are concerned with all aspects of water resources management from an overall regional perspective. Primarily the state and local government agencies provide the framework for existing institutional structures.

As is typical of the rest of New England, the study area is characterized by a tradition of strong local involvement in all resource decision-making. Local governments make many of the most critical water and related land management decisions in the study area. Special interest organizations such as the various watershed associations and citizen groups also play a vital role in influencing decision-making. Other special purpose organizations, such as sewer districts, exist in both states.

Although county government institutions exist in the area, their role in water resources management is minor. Sub-state, regional institutions are prevalent in the study area, with six being located in Massachusetts and Connecticut. Their function, in addition to reconciling various local plans and providing technical assistance within their jurisdiction, includes a role in reviewing grant applications as part of their designation as A-95 clearinghouse agencies. These regional planning agencies are presently conducting Section 208 wastewater management planning within the Connecticut portion of the study area.

Currently, there has been little trend toward regionalization among existing institutions concerned with water resources management. A possible exception is the structure of wastewater management which has developed stronger linkages between State, Federal and local governments with the passage of PL-500 which requires stringent standards for water quality control. Institutional structures of other water resources functions have not experienced any appreciable changes. The following list identifies, in addition to the Corps of Engineers, some of the institutions that have a significant interest in water resources management in the study area.

4. Federal Agencies

a. U.S. Geological Survey, Water Resources Division (USGS)

The overall objectives of the U.S. Geological Survey are to conduct surveys, investigations, and research covering topography, geology, and the mineral and water resources of the United States. The agency is responsible for coordinating all data collected by Federal agencies having to do with water resources. To facilitate this task, the USGS maintains catalogs and maps of water-related information which is useful as a basis for planning.

b. U.S. Department of Agriculture, Soil Conservation Service (SCS)

The Soil Conservation Service directs field operations in the study area and provides technical assistance in the development, application, and maintenance of soil and water conservation plans through local soil conservation districts. The agency is authorized to assist

local governments with planning and financing watershed conservation projects and other flood prevention measures. These programs provide assistance in projects that promote the conservation, development, and use of water and the prevention of soil erosion.

c. U.S. Environmental Protection Agency (EPA)

The Environmental Protection Agency is responsible for the control of air and water pollution, drinking-water quality, solid wastes, pesticides, environmental radiation and noise. Through the legislation contained in PL 92-500, the agency establishes deadlines for clean waters, a system of permits and licenses, water quality standards, a system of user charges and areawide planning. The agency also provides funding and enforcement powers to eliminate the discharge of pollutants into the nation's waters. Congress has authorized EPA to provide state grants for research and development, manpower training, water quality planning, monitoring and enforcement.

d. U.S. Department of Housing and Urban Development (HUD)

Under the provisions of Section 701 of the National Housing Act of 1954, as amended, this agency is involved with state and local governments in planning and developing solutions to housing problems, mass transportation, water supply, water quality management, runoff control and related problems.

e. U.S. Fish and Wildlife Service

The primary goal of this agency is the conservation and enhancement of fish and wildlife resources. Major activities for the conservation of fish and wildlife include the acquisition and management

of National Wildlife Refuges, and the operation of fish breeding, distribution and restoration programs. Other activities include the protection of critical habitats, the enforcement of Federal law protecting wildlife and management of game birds, and consultation with other Federal agencies engaged in water development projects.

f. The Heritage Conservation and Recreation Service

This service, functioning as the central agency within the Federal government concerned with outdoor recreation, is responsible for the preparation of long-range, nationwide, continuing outdoor recreation plans. The service is authorized to provide grants for planning, acquisition and development of recreation areas and facilities.

5. Interstate Agencies

a. New England Interstate Water Pollution Control Commission (NEIWPCC)

The NEIWPCC, authorized in 1947, is a compact consisting of the six New England states and the adjacent State of New York. The primary function of the Commission is the achievement of water pollution abatement and control in the interstate waters of the region. The interests of the Commission include water quality management, surveys and investigations, water classification and coordination of State water pollution control programs as they pertain to interstate waters.

b. New England River Basins Commission (NERBC)

The Commission, a Federal-State planning organization established under the authority of the Water Resources Planning Act of 1965, is composed of the six New England states and New York, ten Federal

agencies, and six other interstate regional agencies concerned with water pollution and flood control. NERBC has three statutory responsibilities; namely, to coordinate water and related land resources plans throughout the region, to prepare and update plans for managing the region's water and related land resources, and to recommend priorities for the collection of natural resource data, solutions to resource management problems and implementation schedules.

6. State Agencies - Massachusetts

a. The Office of State Planning, within the Executive Office of Administration and Finance, is responsible for the management and coordination of all planning activities at the State and regional levels and the development of comprehensive plans for growth and development. The specific areas of responsibility of OSP are in land use planning and policy development.

b. The Executive Office of Environmental Affairs is charged with carrying out the Commonwealth of Massachusetts' environmental policy. The duties assigned to the EOEA include and provide for the following: the management of air, water and land resources to assure their protection and balanced utilization; the propagation, protection, and management of fish and wildlife; and the regulation and protection of marine and coastal fisheries and natural resources. Some of the major agencies concerned with water resources within the EOEA include:

- The Division of Water Resources is responsible for coordinating all water resources activities as they affect the Commonwealth.

In this regard, the Division is charged with the coordination of all water and related land resources activities of Federal, State, regional and interstate agencies.



- The Department of Environmental Quality Engineering (DEQE) has responsibilities which include the management of Section 208 planning programs; administration of the wetlands regulatory program; approval of new water supplies; planning and construction of small and medium river and stream improvement projects; and the licensing and inspection of dams.

- The Division of Water Pollution Control is broadly responsible for improving the quality and value of the Commonwealth's water resources. The Division is also responsible for the establishment of a program supporting the prevention, control and abatement of water pollution and the adoption of water quality standards applicable to the State's water resources. As the primary State agency concerned with water pollution abatement, the Division works in close cooperation with other appropriate Federal, State, interstate and regional agencies in matters related to water quality.

- The duties and responsibilities of the Division of Waterways include the protection of shorelines of the State, while providing the public with safe, functional and convenient access to the public waters of the Commonwealth. The Division of Waterways, because of the similarity of certain work performed, relates to the U.S. Army Corps of Engineers, especially in projects requiring dredging for navigation projects.

7. State Agencies - Connecticut

Responsibility for water resources is vested in three State departments, one regulatory commission and one interagency board. The responsibility for enforcement of various statutes rests primarily with the Departments of Health and Environmental Protection.

a. The Department of Environmental Protection has statutory control over pollution and the allocation of Federal funds for sewerage facilities. Water supply responsibilities include interstate transfers of water. This department is also concerned with the inspection of dams and marinas, flood control work, the establishment of channel encroachment lines and the control of dredging activities.

b. The Department of Health is responsible for the public health aspects of new sources for water supply as well as the inspection of existing water supply sources.

c. The Comprehensive Planning Division of the Office of Policy and Management is concerned with comprehensive policies and planning and is a participant in the IWRPB.

d. The Public Utilities Control Authority regulates rate schedules and the operation of private water supply purveyors, but deals minimally with planning.

e. The Interagency Water Resources Planning Board (IWRPB) consists of representatives from the Departments of Environmental Protection and Health and the Office of Policy and Management, Comprehensive Planning Division.

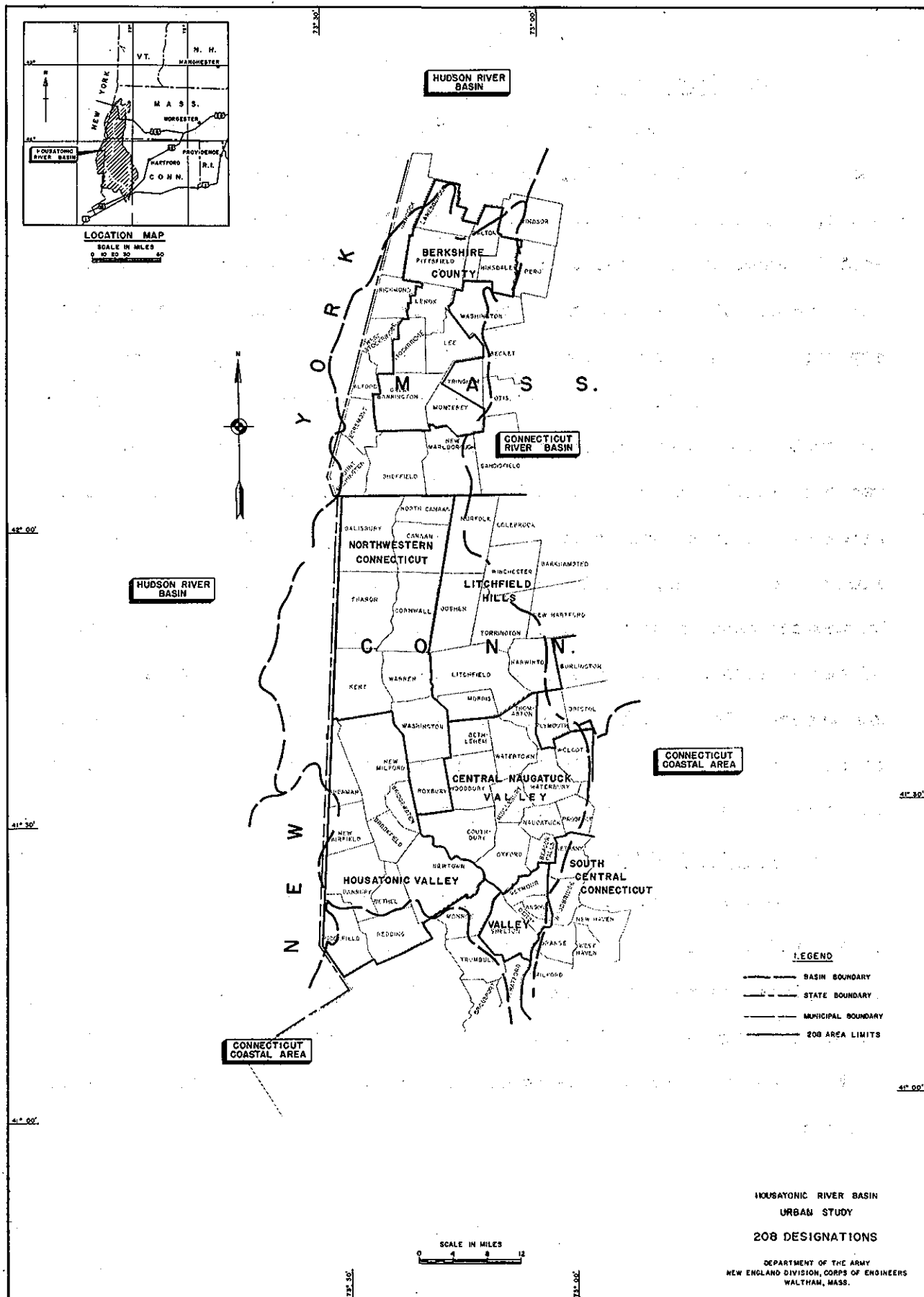
Its basic responsibility is to jointly prepare a Statewide long-range plan for the management of the water resources of the State and other related responsibilities as directed by State Law. Further, it is directed to establish a continuing planning process and to prepare and periodically update the water resource management plan.

f. Regional Planning Agency (RPA)

The Regional Planning Agency, as the name suggests, is responsible for the areawide approach to all aspects of planning and development at the local level. The RPA engages in comprehensive planning in coordination with the overall water resources planning being conducted by the State. Presently, a major effort which the regional planning agencies in Connecticut are engaged in is Section 208 areawide waste treatment management planning in compliance with the Federal Water Pollution Control Act Amendments of 1972. The Berkshire County Regional Planning Commission recently completed the Section 208 planning in their area while the remaining portion of the basin will have its planning for Section 208 done by DEQE. The agencies responsible for Section 208 planning in the urban study area are listed below and shown on Plate 5.

Connecticut

Northwestern Connecticut Regional Planning Agency  
Litchfield Hills Regional Planning Agency  
Central Naugatuck Valley RPA  
Valley RPA  
Housatonic Valley Council of Elected Officials



## 8. Coordination

To insure that water resources plans developed during the study are implementable, close coordination will be made with local, State, regional and Federal agencies regarding the formulation of institutional arrangements. Each alternative urban water resources plan will contain at least two alternative implementation arrangements which may require the presentation of two different institutional arrangements.

Section 208 planning programs are mandated by PL 92-500 to develop a complete management plan. In developing these plans, the various planning agencies will be undertaking, in some respects, similar kinds of institutional analyses that will be required for this urban study. To avoid duplication of effort on institutional analysis of wastewater management plans, the Corps will accept the recommendations of the various regional planning agencies with regard to wastewater management. Identification and evaluation of the institutional impacts of these proposals on the implementation plans developed for the remaining elements of the urban study will be undertaken by the Corps.

### L. Study Management

Study management is concerned with the entire conduct of the urban study. This Reconnaissance Report, being subject to revision as study plans are refined or modified, is intended to serve as the overall guide to management of the study. All parties responsible for the study will insure that the various tasks and schedules outlined will be strictly followed.

The objective of the study management organization will be to facilitate a sound and orderly process leading to plan selection. In order to achieve this objective, the study management structure will consist of a Policy Group, a Study Management Group, and an Advisory Group. This proposed organizational pattern will be used as a guide and may be modified as the needs of the planning effort become more firmly established.

1. Study Responsibility

The Division Engineer, New England Division, U.S. Army Corps of Engineers, will have overall responsibility for the conduct and management of the urban study. Interagency coordinating committees will be organized at the Policy Group, Study Management Group and Advisory Group levels with the Policy Group directing the general course of the study, as well as dealing in the areas of review, policy and coordination.

The day-to-day management of the study will be the responsibility of the study manager -- Chief, Urban Studies Branch. The study team itself will be comprised of a multi-disciplinary unit within the Urban Studies Section augmented by expertise provided by other offices in the Division organization.

Study progress will be monitored by the study manager who will be responsible for comparing progress to time, cost and work effort schedules outlined in the Reconnaissance Report. Modifications to the report will be the responsibility of the Corps of Engineers in response to recommendations from the Policy, Study Management and Advisory Groups.

## 2. Coordination

The Policy Group will consist of representatives of the Office of State Planning within the Executive Office of Administration and Finance and the Executive Office of Environmental Affairs in Massachusetts, the Commissioners of the State of Connecticut Departments of Environmental Protection and Health, and the Secretary of the Office of Policy and Management, the Chairman of the Regional Planning Commissions and the Corps of Engineers.

The Policy Group will perform the following functions:

1. Make study policy decisions and direct the general course of the study.
2. Monitor activities of the Technical Advisory group.
3. Coordinate their respective agency's policies and programs with the urban study.

The Technical Advisory group will be made up of representatives of line agencies within the Commonwealth of Massachusetts and the State of Connecticut having responsibility for water resources planning, the six regional planning agencies located within the study area and the Corps of Engineers.

This group will provide the nucleus for coordination and technical efforts throughout the entire planning process. The functions of this group are as follows:

1. Meet periodically to monitor progress, reassess schedules and establish priorities.
2. Designate tasks and organize task groups from agency representatives as appropriate.
3. Participate in public meetings, workshops and other activities of the public involvement program.
4. Maintain liaison with member agencies to insure that study activities comply with agency policies and to avoid duplication of effort.

Through the Technical Advisory Group, liaison will be established at the working level and the study team will have contact with other Federal and non-Federal agencies in coordination with the Policy Group.



### SECTION III - STUDY EFFORT ALLOCATION

Under the Corps of Engineers Urban Studies Program, assistance will be provided to local, State and regional governments in order to develop water resources plans compatible with broader, more comprehensive urban area plans. This section provides an outline of the study's planning process and presents a general discussion of the major work items that will be considered along with a schedule projecting their completion. In response to the problems and concerns identified previously, this study consists of the following three major work items: inland flood control and flood plain management, water supply management and coastal area restoration and protection. Each of these items will be assembled into four principal effort components, grouping discrete work tasks to facilitate study management and comparability. The Corps will maintain management responsibilities regarding the three work items. Coordination between the Section 208 and Urban Study planning efforts will be provided to avoid duplication of work efforts.

#### A. Study Sequence

The Urban Study will be conducted in three stages, namely:  
Stage 1 - The Reconnaissance Report, Stage 2 - Development of Intermediate Plans, and Stage 3 - Development of Final Plans.

Planning will consist of executing four functional planning tasks during each of the three stages of plan development. These tasks are problem identification, formulation of alternatives, impact assessment and evaluation.

Iteration of these tasks during any of the planning stages may be necessary and even desirable in order to reflect an increasing level of effort, detail and refinement. Iteration also provides for the incorporation of additional information and for broadening the scope of the urban study as it progresses.

The following paragraphs describe the stages of plan development and the major tasks of the planning process.

Stage 1 - Reconnaissance Report - The initial stage of the study effort, the Reconnaissance Report, provides a clear indication of the scope of the Urban Study, the precise study area's planning objectives, specific constraints that have been identified and the scheduling and management of subsequent planning activities.

Stage 2 - Development of Intermediate Plans - Stage 2 planning will concentrate on a more detailed analysis of the problems as well as the development of a preliminary range of solutions at a general level of detail, assessment and evaluation. The development of alternative plans will emphasize interaction between problem identification and plan formulation in an attempt to assure public understanding of the basic issues. The final product of this stage will constitute the basis for determining the scope and direction of planning efforts under Stage 3.

Stage 3 - Development of Final Plans - Stage 3 will concentrate on developing a select number of more detailed alternative urban water resource plans. Extensive public involvement and professional evaluation will be used in order to determine which plans will be evaluated in this stage. Several iterations of the four basic tasks may be needed in order to achieve adequate detailed planning. As a result of Stage 3, an array of alternative water resource plans will be formulated that are responsive to study objectives and the problems and concerns of the region.

B. Planning Process

The planning process to be followed during each stage incorporates the four basic planning functions of problem identification, formulation of alternatives, impact assessment and evaluation.

1. Problem Identification

This task serves to identify the water resource problems the overall study will address and to establish study planning objectives. This will require the development of a regional profile of environmental, social and economic conditions for the study area. The study objectives will guide formulation of alternatives whereas the regional profile will serve as a base condition for determining impact assessment and evaluating capabilities of alternatives.

2. Formulation of Alternatives

Formulation is the process of developing alternative water resource management systems which respond to identified problems and concerns and the study area planning objectives. All potential measures

available for problem solution will be identified and both structural and non-structural measures will be incorporated into developed plans.

### 3. Impact Assessment

This function includes tasks required to determine the effect of each alternative plan on existing social, economic and environmental conditions. These effects will be measured over a determined impact zone and evaluated as to time of occurrence.

### 4. Evaluation

The evaluation function involves work tasks needed to measure and compare the relative values of each alternative plan, particularly in response to achieving the study objectives. Benefits and losses associated with the development of each plan will be described in order to effectively analyze possible trade-offs between plans and recommend actions.

## C. Data Collection and Basic Studies or Data Base Development

Data needed as the foundation in order to perform major work tasks will be generated at the earliest practical date in the study. Data being developed as part of the Section 208 planning programs will be available throughout the urban study. The efforts required in the basic studies areas of the planning process are described briefly in the following paragraphs.

### 1. Socio-Economic Studies

As mentioned previously, studies identifying and evaluating present and future socio-economic conditions in the study area are being developed as part of the Section 208 planning programs. Population

projections and economic data, including industrial growth trends, will be used to assess and evaluate the impacts and study objectives achieved by alternative water resources plans.

## 2. Land-Use Studies

Land-use planning studies prepared for the Section 208 projects will be utilized in the development of comprehensive water resources plans. Data developed by local or regional agencies will be taken into consideration in the assessment of present and future conditions.

## 3. Institutional Arrangements Study

A preliminary survey of major public institutions was completed during preparation of the Reconnaissance Report. A more detailed survey will be undertaken during Stage 2 in order to develop pertinent data on task capability potential of the various Federal, State, regional and local public institutions in the study area. Organization charts, annual reports, legislation, capital budgets and other public documents will be scrutinized to develop a data base on each agency's legal authority, functional role, spatial authority, program responsibility, manpower, organizational and financial structure. Information on and analyses of institutional capabilities for this study will be used to evaluate the capabilities of institutions to implement each alternative plan. Conclusions will be made for each alternative plan as to the need for the modification of existing institutions or legislation or the creation of new institutions or legislation to implement plans.

#### D. Major Work Items

A brief description of the various efforts to be performed for each of the three major work items is presented below. The efforts are described for each of the four functional tasks of the planning process, problem identification, formulation of alternatives, impact assessment and evaluation. While the three items are described individually, the actual plans will be developed concurrently in order to formulate the best overall solution.

##### 1. Inland Flood Control and Flood Plain Management

###### a. Problem Identification

As described earlier, and as shown on Plate 4, inland flooding is one of the major problems in the Housatonic region. Flooding conditions exist in three of the six SMSAs located wholly or partially in the region and the Pittsfield, Massachusetts and Bridgeport, Connecticut SMSAs having the more severe problems.

Flood problem identification to date has revealed four cities and towns within Massachusetts: namely, Pittsfield, Hindsdale, Dalton and Lenox are all subject to inland flooding. Within Connecticut, ten additional communities - Danbury, Brookfield, New Milford, Kent, Derby, Shelton, Oxford, Seymour, Newtown and Southbury - are considered flood prone.

A number of other cities and towns, although not now subject to flooding, could face future damages depending on the amount and method of development experienced. Additional flood problem identi-

fication, in subsequent stages of this urban study, will concentrate on detailed surveys, flood plain delineation, hydraulic and economic studies in areas now subject to flooding. In those areas where changes are expected to have a significant impact on runoff conditions, existing and future land use data and economic and environmental conditions will be analyzed to determine the effects of the changes on existing flood levels.

b. Plan Formulation, Impact Assessment and Evaluation

Formulation of the alternative flood reduction measures for the cities and towns discussed earlier will include the definition of both structural and non-structural plans that will satisfy the flood control and streambank protection needs of the various urban locations within the study area. Structural solutions will include the accomplishment of detailed hydrologic investigations, hydraulic studies, foundation and materials studies, surveys, relocations and real estate considerations. Non-structural measures, such as flood insurance, permanent evacuation and zoning ordinances, will be considered in lieu of and in conjunction with structural alternatives.

Assessment and evaluation will include benefit-cost analyses of formulated alternatives. Economic, social and environmental assessments will be made and impacts on the urban area resulting from plan implementation will be evaluated. Flood control and flood plain management alternatives will be selected for the NED and EQ plans.

## 2. Water Supply Management

### a. Problem Identification

As discussed in earlier sections, a large number of urban cities and towns within the Housatonic region face potential water supply shortages. Water problems may occur in the Pittsfield, Danbury and Waterbury SMSA regions, as well as the Seymour urban area. Within the region, water supply needs are estimated to increase from a 1975 total of 130 mgd to about 180 mgd by 2000, and about 250 mgd by 2030. To determine the location of the demand areas, (including areas outside the basin) an updating and refining of future needs estimates and alternatives will be undertaken. The needs assessment will include an evaluation of the various water conservation measures and their effect on demand.

### b. Plan Formulation, Impact Assessment and Evaluation

In Massachusetts alternatives, which focus on ground-water-surface water resources, will be developed for identified urban need areas. Also, the possibility of groundwater recharge programs, reuse of industrial wastewater effluents and potential reuse of treated stormwater runoff will be investigated and incorporated in the water resource plans where deemed feasible.

The State of Connecticut has developed a set of recommended water supply sites based on their 1976 population projections, indicating a need for water supply for 3.8 million people by the year 2000. These recommendations consist of 90 water supply sites of which 26 are located in the Housatonic River Basin. The surface water sites



are listed in Table 4. The recommended water supply sites were developed to a preliminary level (in most cases without cost estimates) through the Statewide long-range plan for the management of water resources in two phases, they are presented in the State's proposed Plan of Conservation and Development. Phase III is presently being developed.

TABLE 4

SURFACE WATER SUPPLY SITES UNDER CONSIDERATION

(A Plan of Conservation and Development for Connecticut)

<u>TOWN</u>	<u>EXPANSION OF EXISTING RESERVOIRS</u>	<u>DIVERSIONS</u>	<u>NEW RESERVOIRS</u>
Bethany	Hopp Brook		
Bethal			Wolfpit Brook
Danbury		Ball Pond Brook	
Goshen		Jakes Brook	
Harwinton		Lead Mine Brook	Cook Dam - E. Branch Lead Mine Brook
Litchfield			Bantam River
New Milford			West Aspetuck River
Southbury		Shepaug River	
Torrington	Nickle Mine Brook		
Trumbull			Poquonock River
Warren	Upper Shepaug Reservoir & Diversion		

Plans which are evaluated will have an optimum mix of structural and non-structural components. Cost efficient and publically acceptable non-structural technique will complement structural components of alternative plans. Candidates for inclusion on the non-structural side of the plans, include seasonal adjustments of water user fees, water conservation plans and the adoption of low water use appliances. Alternative water supply plans will be checked against future area wide wastewater treatment plans to assure consistency.

An impact assessment will be made for those portions of the area where economic, social or environmental patterns would be altered. Specific changes to be created by an alternative such as expansion of industrial centers, changes in stream ecology, or limitations on community development, will be identified, traced and measured in comparable units. Required changes in water rights law and the modification or expansion of existing institutions required to implement an alternative will be outlined using information gathered from the institutional arrangements study.

The results will be evaluated by determining whether the specific changes from the urban area's base condition caused by each alternative are adverse or beneficial. The attainment of study objectives (economic, equitable supply of dependable high quality water through the year 2030) will be measured for each alternative.

Water supply alternatives for the NED and EQ plans will be selected. Identified choices between alternatives and potential trade-offs, relative to each alternative, will be described and presented for public review.

### 3. Coastal Area Protection

#### a. Problem Identification

As discussed earlier, coastal flood problem areas have been identified through a review of existing flood control and flood plain management reports and field interviews with water resource agencies, local officials and the public. Initial work has identified urban coastal damage centers in Milford and Stratford.

Detailed information on estimated damages to residential, commercial and industrial and public structures, including their contents located within the impact zone of identified floods of record, will be developed. A flood history will be prepared for each of the selected study areas. Maps will depict the aerial extent of floods of record in the selected areas.

Operating from existing regional profiles developed for this urban study, and assuming development of proposed flood control, flood plain management and flood insurance programs, future land use projections will be evaluated to determine increases or decreases in flood damages through 2030.

b. Plan Formulation, Impact Assessment and Evaluation

Both structural and non-structural solutions will be developed including levees and floodwalls, flood plain zoning, and flood-proofing regulations. Combinations of these alternatives will also be considered. Final flood control requirements will be designed and costed on a preliminary basis.

Impact assessment and evaluation procedures similar to those described for the water supply program will be followed for this study effort. Alternatives for coastal area restoration and protection will be selected for the NED and EQ plans.

4. Recreation

It has been indicated by the State of Connecticut that the Housatonic River may presently be receiving recreational use beyond its capacity and greater public access is not needed and would be to the detriment of the river. Also the effect of the current problems with PCB's in the Housatonic River on recreational use has not been determined.

The existing recreational usage throughout the basin and the effect of PCB's on the usage will be determined. The existing usage will also be compared with estimated capacities for the different types of recreational uses, to aid the states in developing plans for future recreational development.

#### E. Scheduling

As noted previously, the Housatonic River basin urban study will be undertaken in three time-phased stages to help facilitate management by specifying at least three points for monitoring study progress and scope while providing for the orderly development of plans.

Detailed breakdowns of each of the major work items being undertaken in the urban study were conducted to permit time schedules, task sequence and cost allocation to be made. The proposed scheduling for the entire urban study is shown on Plate 6. This schedule indicates the anticipated starting and completion dates of the various work tasks to assure their completion prior to the time outputs will be required for subsequent tasks. The overall schedule shown on Plate 6 was designed to accomodate the most realistic funding schedule presently envisioned for this study. The tentative schedule for wastewater management planning in the study area calls for completion prior to January 1980.

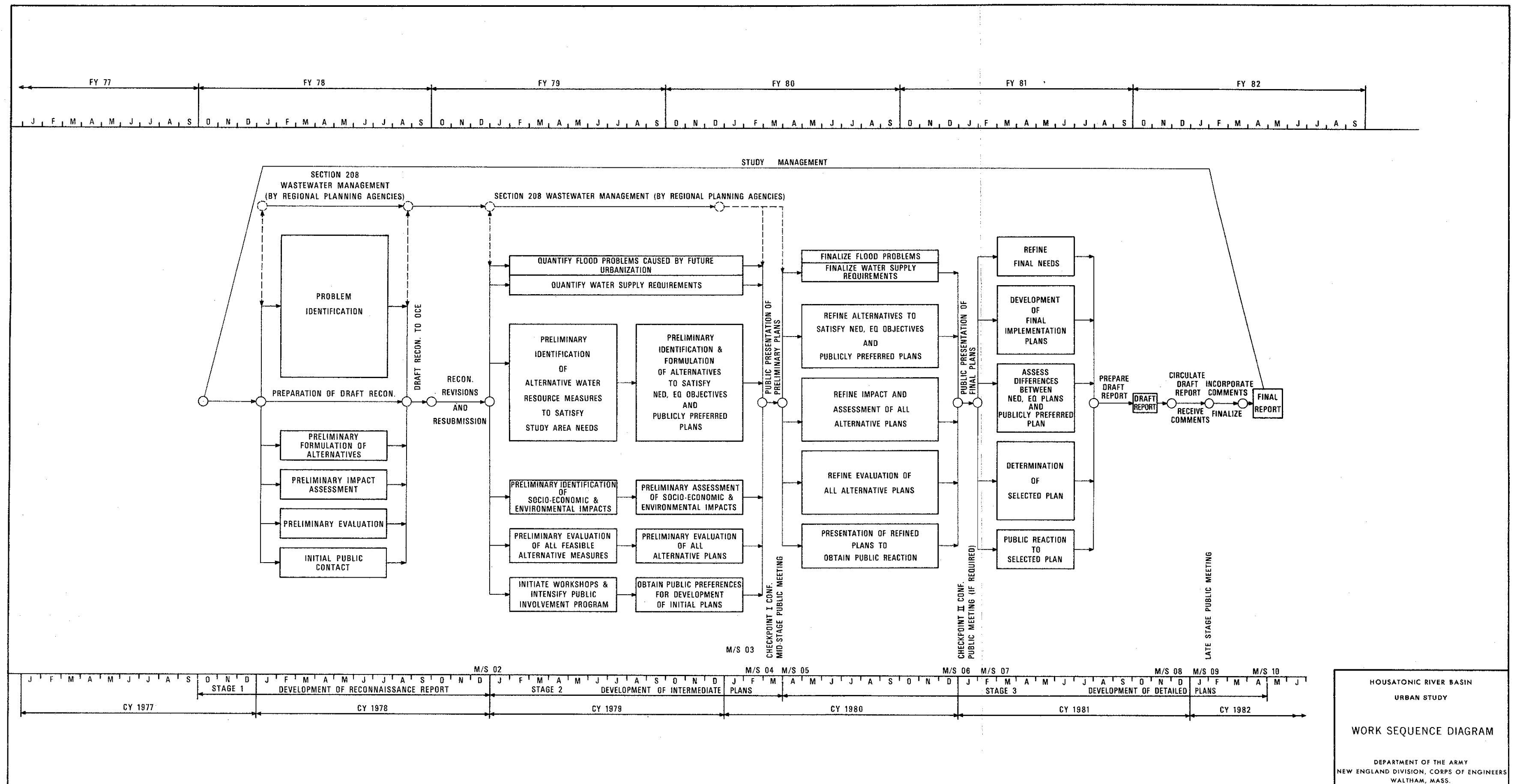
#### F. Work Task Schedules

The intervening results of the urban study will be continually documented during the process of the study. Upon completion of all study efforts, the final study report will consist of a separate summary document and supporting appendices as listed below.

### SUMMARY REPORT

#### Appendices

Background Information (regional profile, problems, concerns, needs and projected future conditions).



Plan Formulation

Impact Assessment and Evaluation

Comments

Institutional Analysis

Design and Costs

Public Involvement

Continuous drafting of these reports will be required throughout the progress of the study to avoid the necessity of completing a time-consuming writing effort at the end of the study. The product of Stage 2 will result in the preparation of the draft Background Information Appendix and a chronological draft of the Plan Formulation Appendix. Analysis of these study documents by all study participants will form the basis for decisions regarding Stage 3 planning accomplishments.

#### STUDY COSTS

The cost for accomplishing each of the major work items shown on the work schedule has been estimated. In view of the wastewater management work being assumed by the Commonwealth of Massachusetts and the State of Connecticut all costs are, therefore, entirely Federal. No cost-sharing is required for accomplishment of the study.

The total overall study effort has been estimated at \$1,430,000. The study is predicated on the study costs being funded in accordance with the following schedule:

FY 1978	\$ 54,000
FY 1979	\$ 180,000
FY 1980	\$ 180,000
Balance After FY 1980	\$1,016,000

The allocation of costs among the various major work items is given in Tables 5 and 6.

TABLE 5

TOTAL STUDY COSTS BY MAJOR WORK ITEM AND EFFORT COMPONENT

(In Thousands of Dollars)

Effort Component	WORK ITEMS				Total For Effort Component
	Inland Flood Control and Floodplain Management	Water Supply Management	Coastal Area Res- toration & Protection	Recreation and PCB Investigation	
1. Preparation of a Plan of Study	\$ 17.0	\$ 23.0	\$ 7.0	\$ 7.0	\$ 54.0
2. Plan Formulation and Evaluation					
a. Problem Identification	45.0	58.0	19.0	19.0	141.0
b. Formulation of Alternatives	115.0	150.0	48.0	48.0	361.0
c. Impact Assessment and Evaluation	115.0	150.0	48.0	48.0	361.0
d. Public Involvement and Institutional Studies	100.0	133.0	42.0	42.0	317.0
3. Study Documentation and Report Preparation	45.0	58.0	19.0	19.0	141.0
4. Study Management	18.0	23.0	7.0	7.0	55.0
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
TOTAL FOR WORK ITEM	\$455.0	\$595.0	\$190.0	\$190.0	\$1,430.0



TABLE 6

FEDERAL AND NON-FEDERAL EFFORTS BY MAJOR WORK ITEM

SUMMARY

	FEDERAL		NON-FEDERAL		TOTAL FOR MAJOR WORK ITEMS	
	Man-Years --	Cost -- (\$1,000)	Man-Years --	Cost -- (\$1,000)	Man-Years --	Cost -- (\$1,000)
Inland Flood Control and Floodplain Management	9.5	\$ 455.0	-	-	9.5	\$ 455.0
Water Supply Management	12.5	595.0	-	-	12.5	595.0
Coastal Area Restoration and Protection	4.0	190.0	-	-	4.0	190.0
Recreation and PCB Investigation	4.0	190.0	-	-	4.0	190.0
TOTALS	30.0	\$1,430.0	-	-	30.0	\$1,430.0

## SECTION IV - CONCLUSIONS & RECOMMENDATIONS

### A. CONCLUSIONS

Within the study area's urban places, the reportedly major existing problems include the following: water supply, recreation, inland flooding and coastal flooding. The prime emphasis of the Housatonic Urban Study is directed toward these problems.

In 1975, public water supply systems within the Housatonic River study area supplied about 130 million gallons per day (mgd) to approximately 75 percent of the people in the region. Preliminary estimates of future supply requirements indicate an increase to 180 mgd in the next 25 years. Existing water supply problems are found in three of the study area's SMSA's and contiguous places. The Danbury SMSA, the Ansonia-Derby-Seymour area in Connecticut and the Pittsfield SMSA in Massachusetts..

Flood control and flood plain management is another problem plaguing the study area. Three of the six SMSA's located partially or wholly within the study area have recorded flood damages. These SMSA's include Pittsfield in Massachusetts and Danbury and Bridgeport in Connecticut. A common problem facing all the urban areas is that future urbanization and encroachment on the flood plains can be expected to increase flood damages if development does not occur wisely.

Preliminary findings of testing programs underway in both states have found traces of PCB's in segments of the river and in fish samples. The testing programs and analysis are not yet complete, but both states have issued warnings that fish or wildlife taken from the Housatonic River should not be eaten.

Tidal flooding has been identified as a potential problem in Stratford and Milford, Connecticut. Preliminary investigations have indicated that a 100-year frequency storm would cause widespread residential damage.

The Housatonic Urban Study will focus on these problem areas. Plans to meet the following needs will be developed and evaluated: an adequate source of municipal and industrial water supply, wise use of flood plains and protection against coastal and riverine flooding.

The effect of PCB contamination on the existing recreational usage throughout the basin will be determined.

B. RECOMMENDATIONS

The Division Engineer recommends that study efforts proceed with the initiation of Stage II as outlined in this Reconnaissance Report.

APPENDIX A

Congressional Resolutions

COMMITTEE ON PUBLIC WORKS  
HOUSE OF REPRESENTATIVES, U.S.  
WASHINGTON, D.C. 20515

R E S O L U T I O N

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Resolved by the Committee on Public Works of the House of Representatives, United States, that the Secretary of the Army, acting through the Chief of Engineers, is hereby authorized, in connection with the preparation of plans to meet the long-range needs of the northeastern United States as authorized by Section 101 of Public Law 89-298, to conduct a study in cooperation with the Commonwealth of Massachusetts to provide a plan for the development, utilization, and conservation of water and related land resources within the Housatonic River Basin. The scope of such study shall be established with the consultation of the State of Massachusetts and the Environmental Protection Agency and other interested Federal agencies. Such study to include, but not be limited to, consideration of the needs of flood control of both an urban and rural nature including local storm drainage, wide use of flood plain lands, wastewater management facilities, including stormwater runoff, regional water supply, water quality control, recreation,

Adopted April 11, 1974

Attest: \_\_\_\_\_

*John A. Blatnik*  
John A. Blatnik, M. C.  
Chairman

Requested by: Hon. Silvio O. Conte

fish and wildlife conservation, protection and enhancement of aesthetic qualities, and other measures for enhancement and protection of the environment on streams in the urban area and shall be conducted with the participation, consultation and cooperation of the Environmental Protection Agency and State and local water pollution control agencies and, where appropriate, State and local agencies with environmental responsibilities.

COMMITTEE ON PUBLIC WORKS  
HOUSE OF REPRESENTATIVES, U.S.  
WASHINGTON, D.C. 20515

R E S O L U T I O N

---

Resolved by the Committee on Public Works of the House of Representatives, United States, that the Secretary of the Army, acting through the Chief of Engineers, is hereby authorized, in connection with the preparation of plans to meet the long-range needs of the northeastern United States as authorized by section 101 of Public Law 89-298, to cooperate with the State of Connecticut in conducting a study to recommend improvements in wastewater management and alternatives thereto within the Housatonic River Basin. The scope of such study shall be established with the consultation of the State of Connecticut and the Environmental Protection Agency and shall include measures for wastewater management including cleanup and restoration in the interest of water supply, environmental quality, recreation, fish and wildlife, and other allied water purposes, and shall be conducted with the participation, consultation, and cooperation of the Environmental Protection Agency and State and local water

Adopted June 14, 1972

Attest:

John A. Blatnik, M. C.  
Chairman

Requested by: Hon. Ella T. Grasso

pollution control agencies and, where appropriate, State and local agencies with environmental planning responsibilities.



## United States Senate

COMMITTEE ON PUBLIC WORKS

## COMMITTEE RESOLUTION

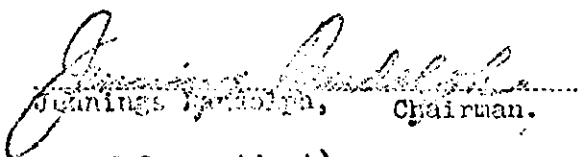
RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE,

That the Secretary of the Army, acting through the Chief of Engineers,  
is hereby authorized, in connection with the preparation of plans

to meet the long-range water needs of the northeastern United States  
as authorized by Section 101 of Public Law 89-298, to cooperate with  
the State of Connecticut in conducting a study to recommend improve-  
ments in wastewater management and alternatives thereto within the  
Housatonic River Basin. The scope of such study shall be established  
with the consultation of the State of Connecticut and the Environmental  
Protection Agency and shall include measures for wastewater management  
including cleanup and restoration in the interest of water supply,  
environmental quality, recreation, fish and wildlife, and other allied  
water purposes, and shall be conducted with the participation, consulta-  
tion, and cooperation of the Environmental Protection Agency and state  
and local water pollution control agencies and, where appropriate,  
state and local agencies with environmental planning responsibilities.

Adopted: May 25, 1972

GPO 48-028-1

  
Jennings Randolph, Chairman.

(At the request of Senator Abe Ribicoff of Connecticut)

APPENDIX B

U.S. Fish and Wildlife Service, Report



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
ECOLOGICAL SERVICES  
P. O. BOX 1518  
CONCORD, NEW HAMPSHIRE 03301

July 5, 1978

Colonel John P. Chandler  
Division Engineer  
New England Division, Corps of Engineers  
424 Trapelo Road  
Waltham, Massachusetts 02154

Dear Colonel Chandler:

This is our preliminary fish and wildlife inventory and assessment for the Housatonic River Basin Urban Study, Massachusetts and Connecticut. It is submitted in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

The Housatonic River Basin contains a variety of fish and wildlife habitats, which support a diverse population of fish and wildlife species. Habitats include forested hills of the Berkshires in the southwestern and northwestern corners of Massachusetts and Connecticut, respectively, lakes, ponds and man-made reservoirs scattered throughout the basin, wetland habitat along the mainstem Housatonic River, abandoned and active farmland in the river valleys, the many cold-water and warm-water rivers, streams and brooks that eventually feed the Housatonic River, and the estuarine portion of the river that extends inland several miles from Long Island Sound.

Species likely to be found in the forested, hilly portion of the basin include the white-tailed deer and coyote. Black bear and bobcat can be found in the more remote northern section of the basin. Birds and mammals frequenting the river valley would include the ruffed grouse, pheasant, woodcock, cottontail rabbit, gray squirrel, red and gray fox and raccoon. Wetlands would support many species of waterfowl, and furbearers such as the raccoon, mink, muskrat, otter, and beaver. Other small mammals, such as mice, moles, shrews, etc., and numerous species of song and other non-game birds, including raptors, would be found throughout the basin habitats.

Major fish species found in the lakes, streams and rivers include brook, brown and rainbow trout, kokanee salmon, smallmouth and largemouth bass, northern pike, pickerel, yellow perch, sunfish, bullhead, suckers, and various minnows. In the estuarine portion of the basin various anadromous species such as the American shad, sea-run brown trout, alewife and blueback herring are found. In addition, one of the major oyster-producing areas in Long Island Sound is the lower Housatonic River. A listing of bird, mammal and fish species found in the Housatonic River Basin is attached.

Both the Massachusetts Division of Fisheries and Wildlife and the Connecticut Department of Environmental Protection conduct fish and wildlife management and stocking programs within the basin. Over 80 ponds and streams are stocked with trout annually in the Massachusetts portion of the basin, and over 75 in Connecticut. Pheasants are stocked throughout the basin in wildlife management areas, state forests, and other suitable areas. Both states have active wild turkey restoration programs in the basin. In general, hunting and fishing opportunities in the Housatonic River Basin are as good as in any other section of either state.

Private conservation organizations active in the Housatonic River Basin would include the Audubon Societies of Massachusetts and Connecticut, which have several sanctuaries located here, such as Pleasant Valley and Canoe Meadow in Massachusetts, and the Sharon Audubon Center in Connecticut. The White Memorial Foundation, located in Litchfield, Connecticut, operates a several thousand-acre sanctuary.

Fish and wildlife resources can be affected directly and/or indirectly, beneficially and/or adversely, by proposals for wastewater management, water supply, and flood control. Wastewater management usually takes the form of sewage treatment plants, sewer lines and interceptors. However, it could also involve areawide planning for the treatment of non-point sources of pollution, such as agricultural wastes and stormwater runoff. In general, wastewater treatment projects are usually beneficial to fish and wildlife resources, by reducing and/or treating domestic and industrial discharges. Fish and wildlife resources may be adversely affected by these proposals, however, because of improper siting of treatment facilities in wetlands or productive shallow water habitats, by routing sewer lines through wetlands and water bodies without examining alternative routes or implementing proper construction procedures, or by treating pollutant discharges with excessively high levels of chlorine or other biotoxins that can in themselves kill or harm aquatic life. Areawide (208) studies are currently being conducted by state and regional planning commissions to plan for the 1983 water quality goals in the Housatonic basin.

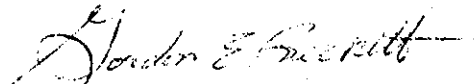
Water supply projects are hard to generalize about, since they may take various forms. Water supply reservoirs can eliminate valuable stream and river fisheries, and inundate productive wildlife habitats. These adverse effects can be mitigated by the acquisition and management of additional fish and wildlife habitats. River diversions can be neutral in their effect, or they can be detrimental to fishery resources by withdrawing water needed to provide optimum flows for aquatic life.

Ground water resources may be tapped for water supply, and again could be neutral or detrimental to fish and wildlife resources depending on the effects of withdrawal on surface water bodies and wetlands.

Flood control projects span the range from non-structural measures such as floodplain zoning and floodplain evaluation, to structural methods such as large dams and reservoirs. Effects on fish and wildlife resources depend on the type of project. Non-structural solutions have an indirect benefit in that no fish and wildlife habitat is lost, and acquisition of floodplain habitat or wetlands preserve natural resource habitat. Mitigating features can be incorporated into many projects, and acquisition and management of additional project land can become a part of large projects such as dams and reservoirs. The Fish and Wildlife Service normally encourages non-structural solutions, such as purchasing or obtaining easements of floodplain or wetlands, and when structural solution are necessary, recommends the least damaging proposal that meets the project objective, and mitigating and/or compensating for any unavoidable habitat losses..

We will be pleased to continue working with you on this study as you focus in on specific problem areas and solutions.

Sincerely yours,

  
Gordon E. Beckett  
Supervisor

Attachments

## HOUSATONIC RIVER

America eel (*Anguilla rostrata*)  
alewife (*Alosa pseudoharengus*)  
rainbow trout (*Salmo gairdneri*) - Lake Lillinoah - only in spring  
brook trout (*Salvelinus fontinalis*)  
brown trout (*Salmo trutta*)  
chain pickerel (*Esox niger*) - Lake Lillinoah  
carp (*Cyprinus carpio*)  
cutlips minnow (*Exoglossum maxillingua*)  
golden shiner (*Notemigonus crysoleucas*)  
bridled shiner (*Notropis bifrenatus*)  
common shiner (*Notropis cornutus*)  
spottail shiner (*Notropis hudsonius*)  
blacknose dace (*Rhinichthys atratulus*)  
longnose dace (*Rhinichthys cataractae*)  
creek chub (*Semotilus atromaculatus*)  
fallfish (*Semotilus corporalis*)  
white sucker (*Catostomus commersoni*)  
creek chubsucker (*Erimyzon oblongus*)  
white catfish (*Ictalurus catus*) - not common  
brown bullhead (*Ictalurus nebulosus*)  
banded killifish (*Fundulus diaphanus*)  
white perch (*Morone americana*)  
rock bass (*Ambloplites rupestris*)  
redbreast sunfish (*Lepomis auritus*)  
pumpkinseed (*Lepomis gibbosus*)  
bluegill (*Lepomis macrochirus*)  
smallmouth bass (*Micropterus dolomieu*)  
largemouth bass (*Micropterus salmoides*)  
black crappie (*Pomoxis nigromaculatus*)  
tessellated darter (*Etheostoma olmstedii*)  
walleye (*Stizostedion vitreum*)  
yellow perch (*Perca flavescens*)  
northern pike (*Esox lucius*) - Lake Lillinoah

## MAMMALS

Virginia Opossum (*Didelphis marsupialis*)  
Common Mole (*Scalopus aquaticus*)  
Hairy-Tailed Mole (*Parascalops breweri*)  
Star-Nosed Mole (*Condylura cristata*)  
Masked Shrew (*Sorex cinereus*)  
Northern Water Shrew (*Sorex palustris*)  
Shorttail Shrew (*Blarina brevicauda*)  
Little Brown Bat (*Myotis lucifugus*)  
Silver-Haired Bat (*Lasionycteris noctivagans*)  
Eastern Pipistrelle (*Pipistrellus subflavus*)  
Big Brown Bat (*Eptesicus fuscus*)  
Red Bat (*Lasiurus borealis*)  
Hoary Bat (*Lasiurus cinereus*)  
Raccoon (*Procyon lotor*)  
Shorttail Weasel (*Mustela erminea*)  
Longtail Weasel (*Mustela frenata*)  
Mink (*Mustela vison*)  
Otter (*Lutra canadensis*)  
Striped Skunk (*Mephitis mephitis*)  
Red Fox (*Vulpes fulva*)  
Gray Fox (*Urocyon cinereoargenteus*)  
Bobcat (*Lynx rufus*)  
Woodchuck (*Marmota monax*)  
Eastern Chipmunk (*Tamias striatus*)  
Red Squirrel (*Tamiasciurus hudsonicus*)  
Eastern Gray Squirrel (*Sciurus carolinensis*)  
Southern Flying Squirrel (*Glaucomys volans*)  
Beaver (*Castor canadensis*)  
White-Footed Mouse (*Peromyscus leucopus*)  
Meadow Vole (*Microtus pennsylvanicus*)  
Muskrat (*Ondatra zibethicus*)  
House Mouse (*Mus musculus*)  
Norway Rat (*Rattus norvegicus*)  
Meadow Jumping Mouse (*Zapus hudsonius*)  
Woodland Jumping Mouse (*Nepaeozapus insignis*)  
Porcupine (*Erethizon dorsatum*)  
Snowshoe Hare (*Lepus americanus*)  
Cottontail (*Sylvilagus floridanus*)  
New England Cottontail (*Sylvilagus transitionalis*)  
White-Tailed Deer (*Odocoileus virginianus*)

# BIRDS

Pied-Billed Grebe  
 Great Blue Heron "R"  
 Green Heron "X"  
 American Bittern "R"  
 Canada Goose "X"  
 Mallard "X"  
 Black Duck "X"  
 Blue-Winged Teal  
 Wood Duck "X"  
 Ring-Necked Duck  
 Common Goldeneye  
 Hooded Merganser  
 Common Merganser  
 Turkey Vulture "X"  
 Goshawk "X" & "R"  
 Sharp-Shinned Hawk "R"  
 Cooper's Hawk "R"  
 Red-Tailed Hawk "X"  
 Red-Shouldered Hawk "R"  
 Broad-Winged Hawk "X"  
 Marsh Hawk "R"  
 Osprey "R"  
 Peregrine Falcon "R"  
 Sparrow Hawk "X"  
 Ruffed Grouse "X"  
 Bobwhite "X"  
 Ring-Necked Pheasant "X"  
 Turkey  
 Virginia Rail "X"  
 Sora  
 Killdeer "X"  
 American Woodcock "X"  
 Common Snipe "X"  
 Spotted Sandpiper "X"  
 Pectoral Sandpiper  
 Rock Dove "X"  
 Mourning Dove "X"  
 Yellow-Billed Cuckoo "X"  
 Black-Billed Cuckoo "X"  
 Screech Owl "X"  
 Great Horned Owl "X"  
 Barred Owl "X"  
 Saw-Whet Owl  
 Whip-Poor-Will "X"  
 Common Nighthawk "X"  
 Chimney Swift "X"  
 Ruby-Throated Hummingbird "X"  
 Belted Kingfisher "X"  
 Yellow-Shafted Flicker "X"  
 Pileated Woodpecker "X"

Red-Bellied Woodpecker "R"  
 Yellow-Bellied Sapsucker "R"  
 Hairy Woodpecker "X"  
 Downy Woodpecker "X"  
 Eastern Kingbird "X"  
 Great Crested Flycatcher "X"  
 Eastern Phoebe "X"  
 Alder Flycatcher "X" & "R"  
 Traill's Flycatcher "X"  
 Least Flycatcher "X"  
 Wood Eastern Pewee "X"  
 Olive-Sided Flycatcher  
 Horned Lark "R"  
 Tree Swallow "X"  
 Bank Swallow "X"  
 Rough-Winged Swallow "X"  
 Barn Swallow "X"  
 Cliff Swallow "X" & "R"  
 Purple Martin "X" & "R"  
 Blue Jay "X"  
 Common Crow "X"  
 Black-Capped Chickadee "X"  
 Tufted Titmouse "X"  
 White-Breasted Nuthatch "X"  
 Red-Breasted Nuthatch "X"  
 Brown Creeper "X"  
 House Wren "X"  
 Winter Wren "X"  
 Long-Billed Marsh Wren  
 Short-Billed Marsh Wren "X" &  
 Mockingbird "X"  
 Catbird "X"  
 Brown Thrasher "X"  
 Robin "X"  
 Wood Thrush "X"  
 Hermit Thrush  
 Swainson's Thrush "R"  
 Gray-Cheeked Thrush  
 Veery "X"  
 Eastern Bluebird "X" & "R"  
 Blue-Gray Gnatcatcher "X"  
 Golden-Crowned Kinglet "R"  
 Ruby-Crowned Kinglet  
 Cedar Waxwing "X"  
 Starling "X"  
 White-Eyed Vireo "X"  
 Yellow-Throated Vireo "X"  
 Solitary Vireo  
 Red-Eyed Vireo "X"  
 Warbling Vireo "X"



BIRDS (continued)

Black-and-White Warbler "X"  
Worm-Eating Warbler  
Golden-Winged Warbler "X"  
Blue-Winged Warbler "X"  
Tennessee Warbler  
Nashville Warbler  
Parula Warbler "X" & "R"  
Yellow Warbler "X"  
Magnolia Warbler "X" & "R"  
Cape May Warbler  
Black-Throated Blue Warbler "X"  
Myrtle Warbler "X" & "R"  
Black-Throated Green Warbler "X"  
Blackburnian Warbler "X"  
Chestnut-Sided Warbler "X"  
Bay-Breasted Warbler  
Blackpoll Warbler  
Pine Warbler "R"  
Prairie Warbler "X"  
Palm Warbler  
Ovenbird "X"  
Northern Waterthrush "X"  
Louisiana Waterthrush "X"  
Yellowthroat "X"  
Yellow-Breasted Chat  
Hooded Warbler  
Wilson's Warbler  
Canada Warbler "X"  
American Redstart "X"  
House Sparrow "X"  
Bobolink "X"  
Eastern Meadowlark "X"  
Redwinged Blackbird "X"  
Northern Oriole "X"

Common Grackle "X"  
Brown-Headed Cowbird "X"  
Scarlet Tanager "X"  
Cardinal "X"  
Rose-Breasted Grosbeak "X"  
Indigo Bunting "X"  
Dickcissel  
Evening Grosbeak "R"  
Purple Finch "X"  
House Finch  
Pine Grosbeak  
Common Redpoll  
Pine Siskin  
American Goldfinch "X"  
Red Crossbill  
White-Winged Crossbill  
Rufous-Sided Towhee "X"  
Savannah Sparrow "R"  
Vesper Sparrow "R"  
Slate-Colored Junco "X"  
Tree Sparrow  
Chipping Sparrow "X"  
Field Sparrow "X"  
White-Crowned Sparrow  
White-Throated Sparrow "X"  
Fox Sparrow  
Lincoln's Sparrow  
Swamp Sparrow "X"  
Song Sparrow "X"

"X" = breeding

"R" = Listed in "Rare & Endangered Species  
of Connecticut and Their Habitats".

APPENDIX C

Letters of Comment



# STATE OF CONNECTICUT

## OFFICE OF POLICY AND MANAGEMENT

340 CAPITOL AVENUE - HARTFORD, CONNECTICUT 06115

November 28, 1978

Mr. Joseph L. Ignazio  
Chief, Planning Division  
Department of the Army  
New England Division  
Corps of Engineers  
424 Trapelo Road  
Waltham, MA 02154

Dear Mr. Ignazio:

The Interagency Water Resources Planning Board (IWRPB) members have reviewed the Housatonic River Basin Urban Study Draft Reconnaissance Report which was prepared by your staff (October, 1978). The plan of study as set forth in the above mentioned document is endorsed by the IWRPB. We view the report as a conceptual framework for the Housatonic Urban Study.

We anticipate our continued participation in the refinement of the Plan of Study as Stage II of the planning process progresses.

We look forward to carrying on a close working relationship with your staff in the development of this study.

Sincerely,

A handwritten signature in cursive script that reads "Harold Ames".

Harold Ames, Chairman  
Interagency Water Resources  
Planning Board



RICHARD E. KENDALL  
COMMISSIONER

*The Commonwealth of Massachusetts*  
*Executive Office of Environmental Affairs*  
*Department of Environmental Management*  
*Leverett Saltonstall Building, Government Center*  
*100 Cambridge Street, Boston 02202*

November 16, 1978

Mr. Joseph L. Ignazio  
Chief, Planning Division  
Department of the Army  
New England Division  
Corps of Engineers  
424 Trapelo Rd.  
Waltham, MA 02154

Dear Mr. Ignazio:

We have reviewed the Housatonic River Basin Urban Study, Draft Reconnaissance Report, and support your proceeding into the second phase of the study. It will be especially important to coordinate closely with this office because of specific efforts being conducted by the Water Resources Commission to address several water supply issues identified in your reconnaissance report. As you know, we are deeply involved in the Lee-Lenox water problem and in the relative availability and suitability of surface and sub-surface sources of supply.

The draft speaks of the PCB problem mainly in terms of evaluating its effect on uses. I think it fair to say that our earlier suggestion that the PCB problem was of primary state concern envisioned somewhat more attention. We feel it should be established whether any corrective measures are feasible.

The Hudson River Basin Level B study has recommended a program of dredging of "hot spots" to reduce PCB contamination. We would expect the study to determine if practical measures could be employed to reduce PCB levels in the Housatonic.

As stated earlier, we support the continuation of the study, and hope that great emphasis will be placed on satisfying state and local objectives.

Sincerely yours,

*Richard E. Kendall*

Richard E. Kendall  
Commissioner

REK/EHC/aaa

**BERKSHIRE COUNTY REGIONAL PLANNING COMMISSION**

**10 FENN STREET, PITTSFIELD, MASSACHUSETTS 01201**

**TELEPHONE (413) 442-1521**

**WILLIAM R. HARRISON, Chairman**  
**MARY ELLEN AUSMAN, Vice-Chairman**  
**JUDITH MILLER, Clerk**  
**RALPH D'ELIA, Treasurer**  
**RALPH RENZI, Member-At-Large**  
**PHILIP C. AHERN, Honorary Chairman**

**KARL HEKLER, AIP**  
**Director**

November 29, 1978

Mr. Joseph L. Ignazio, Chief  
Planning Division  
U. S. Army Corps of Engineers  
424 Trapelo Road  
Waltham, Massachusetts 02154

RE: Housatonic Urban Study - Draft Reconnaissance Report

Dear Mr. Ignazio:

At its meeting of November 16, 1978 the Berkshire County Regional Planning Commission discussed the report referenced above, and would like to submit the following comments:

1. The report appears to be very responsive to the water resource issues that were discussed with Robert Martin of your staff in his visits to Berkshire County. The priorities and work tasks adequately reflect the area's water resource planning needs as we see them.
2. The analysis of water supply, and especially an investigation of PCB contamination in potential drinking water supplies, (i.e. groundwater), will be very valuable to the region.

The more detail that you can provide, the more useful the urban study will be. For example, the Town of Great Barrington would like to protect the aquifer in the Van Deusenville section of that town, and they would like more definite information on the boundary and reserves of the aquifer. There is a need to verify the "potential" of many groundwater areas (both in quantity and in quality) so that communities can rely on these water resources with a greater degree of certainty.

3. As you are aware, the formulation of plans to reduce flood damage is a very high priority in the Upper Housatonic area. Several communities are interested in flood problems on tributaries as well as along the main stem, i.e. Monterey - Lake Buel area; and Great Barrington - the Green River. It is our hope that the existing data, studies and preliminary flood control plans will enable you to move very quickly into the detailed planning stage for flood damage reduction.

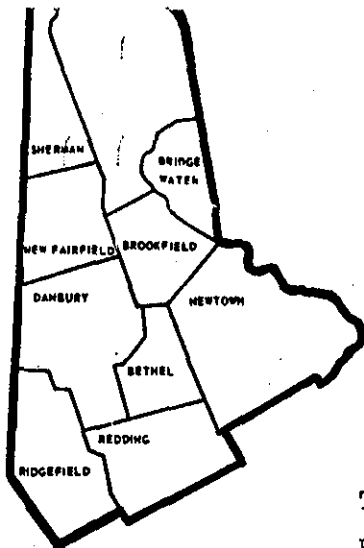
Thank you for the opportunity to review the Draft Reconnaissance Report. Please let us know if we can provide you with additional information or lend additional support for the Housatonic Urban Study.

Sincerely,

A handwritten signature in cursive script, appearing to read "Karl Hekler".

Karl Hekler  
Director

KH/bb



# HOUSATONIC VALLEY COUNCIL of ELECTED OFFICIALS

256 Main St.  
Danbury, Conn. 06810  
Telephone (203) 743-2769

## M E M O R A N D U M

TO : Joseph L. Ignazio, Chief Pl Div, Corps of Engrs  
FROM: James T. Grehan, Executive Director  
DATE: December 7th, 1978  
RE : Housatonic Urban Study, Reconnaissance Report

This to advise staff has reviewed up report and endorses the high priority given to the study of water supply.

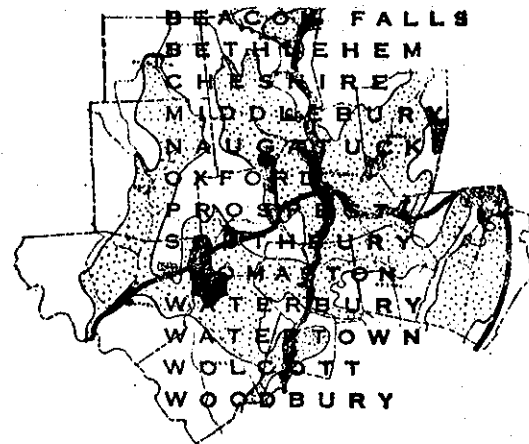
We would urge you to proceed with this vital study as quickly as possible.

#

C-5

THE REGION WITH A PLAN FOR THE FUTURE

**CENTRAL NAUGATUCK VALLEY  
REGIONAL PLANNING AGENCY**



December 22, 1978

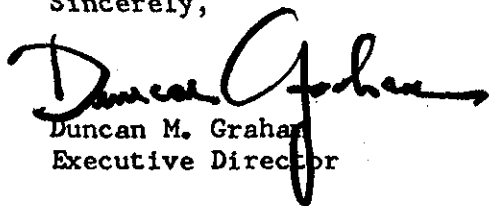
Joseph L. Ignazio  
Chief, Planning Division  
Department of the Army  
New England Division, Corps of Engineers  
424 Trapelo Road  
Waltham, Massachusetts 02154

Dear Mr. Ignazio:

Having met with Robert Martin of your staff on December 12, 1978 to resolve our questions with the draft, "Housatonic Urban Study Reconnaissance Report" the Central Naugatuck Valley Regional Planning Agency would like to express support for the report. We concur with the urban water resource problems identified in this document and support the concept of an "urban study" planning effort by the Army Corps of Engineers to recommend solutions to these pressing problems.

We look forward to a productive working relationship with the Army Corps of Engineers in this regard.

Sincerely,

  
Duncan M. Graham  
Executive Director

G:h

C-6





**Valley Regional Planning Agency**  
**railroad station - main street**  
**derby, connecticut 06418**

November 15, 1978

Mr. Joseph L. Ignazio, Chief  
Planning Division  
U.S. Army Corp of Engineers  
424 Trapelo Road  
Waltham, MA 02154

Attention: NEDPL-BU

Dear Mr. Ignazio:

The staff of the Valley Regional Planning Agency has reviewed the Housatonic River Basin Urban Study, Draft Reconnaissance Report, as requested. This communication will serve as a letter of support for the above mentioned study. We fully concur with the proposed plan.

We do however, have the following comments to make:

On page 4 of the Preface, the report says that, "The State of Connecticut has indicated that the Housatonic River may presently be receiving recreational use beyond its capacity and greater public access is not needed and would be to the detriment of the river..." During verbal communication with Mr. Robert Martin of your staff, he indicated that the source of this information was a memorandum from an individual at the Connecticut Department of Environmental Protection. However, the State Comprehensive Outdoor Recreation Plan (SCORP) makes no reference to this matter. Our comment is this: Does a memorandum from a staff member of the DEP indicate State policy, or does an adopted plan do so? The Housatonic Urban Study should be consistent with adopted State policies.

C-7

**ansonia • derby (203) 735-8688 seymour • shelton**

Mr. Joseph L. Ignazio

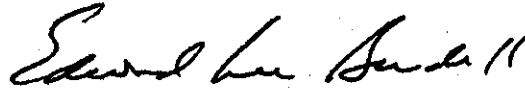
-2-

November 15, 1978

Further, it is hoped that during the study of water supply in the basin, attention will be given to water company lands, which total thousands of acres in the study area. More specifically, we request that the study address the following: land that is currently in active use as a watershed for surface water supplies or groundwater recharge areas and land that is not in active use and can be declared as surplus and disposed of or developed by the owner.

We would be happy to meet with a member of your staff to discuss these comments. Thank you for the opportunity to review the draft plan of study.

Sincerely,

A handwritten signature in dark ink, appearing to read "Edward Lee Burdell".

Edward Lee Burdell  
Executive Director

ELB/gy